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# THE PRACTICAL TEACHER

AT BUXTON:
EARLY VISITORS TO THE PUBLISHERS' EXHIBITION.

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OF THE

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THE
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A MONTHLY MAGAZINE AND REVIEW FOR THE SCHOOL-ROOM AND THE STUDY

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## EDUCATION IN PARLIAMENT—MARCH-APRIL.

THE two features of this part of the Parliamentary session have been the Employment of Children Bill and the London Education Bill. The first is of wide and general import to schools and to the nation—to schools in its effect, if carried into law, upon attendance at school; and to the nation in its effect upon the education and physique of children who are now little white slaves and bearers of untimely burdens. The second is of vast import to the metropolis of the United Kingdom, and ought to be the complement of the great Education Act of 1902.

### THE EMPLOYMENT OF CHILDREN BILL.

"Be it enacted as follows," says the preamble of this measure, and the Bill proceeds to affirm that

> "The council of any county or borough may make bye-laws—
>
> "Prescribing for all children, or for boys and girls separately, and with respect to all occupations, or to any specified occupation—
>
> "(*a*) The age below which employment is illegal; and
>
> "(*b*) The hours between which employment is illegal; and
>
> "(*c*) The number of daily and weekly hours beyond which employment is illegal."

Note the neat, antithetical, concise style of the Bill so far; it is quite a model of Parliamentary draughtsmanship—clear, easy to understand, and logically set out. But it goes on to affirm that the council of any county or borough may make bye-laws which also

> "Prohibit absolutely, or permit subject to conditions, the employment of children in any specified occupation which may be shown to be dangerous to health or morals."

So that the ground is fairly well covered, though in a permissive and optional way, by this very paragon-like Bill.

Children exempt from attendance at school under the Education Acts, or working under Factory or Mines Acts, are to be exempt from the operation of these bye-laws, it is true; but then the Bill goes on to regulate many occupations in which children are employed which have never been regulated before. For instance, street-trading: the bye-laws may prohibit it for persons under sixteen years old, except on conditions and subject to the holding of a license; may determine the days and hours during which, and the places at which, such trading may be carried on. As a rule, a child is not to be employed in any occupation between nine in the evening and six in the morning; or to lift, carry, or move anything so heavy as to be likely to cause injury to the child. And if any person employs a child or other person under the age of sixteen in contravention of any bye-laws or the Bill, he shall be liable on summary conviction, and to a fine not exceeding forty shillings, or, on a subsequent offence, five pounds.

The parent or guardian who knowingly permits such an infraction of the law shall be liable to the like fine, and the child or young person himself is made liable to a fine, or to being sent to an industrial school.

Now this is a step forward, permissive though the measure be. It might be better that the local authorities should be directed, instead of permitted, to make the bye-laws in question; and it would be well to prohibit absolutely street-trading by girls under sixteen years of age. Similarly, there are many details in which the Bill might be bettered; but it goes to the Grand Committee on Trade, where Mr. Gray and Dr. Macnamara will look after such matters. After all, it is wise that prohibitory and penal legislation of a new kind should be introduced gradually rather than abruptly, lest revulsion or repugnance should defeat even a degree of good. *Festina lente* is a motto which a Parliamentarian must respect.

One must remember that there is only a moral necessity as the driving force behind this Bill; it is not like the other, a thing that *must* be done, because of the breakdown in going concerns which otherwise would occur. Moral force is the greatest force in the world, it

is true; but in Parliament there is not too much scope for moral force alone. "Talent does what it can, genius does what it *must*;" and in this respect, and this only, Parliament is a genius.

### THE LONDON EDUCATION BILL.

The secret had been well kept, up to the very moment in which Sir William Anson rose. The date was April 7th, and for nearly two months people had been conjecturing what he would have to say. Such forecasts of the Bill as had been published—and they were many—were the results of skilful conjecture. The field for such conjecture was not wide, the limits of the possibilities of the Bill were certain, and the forecasts could hardly fail to be near the truth in some particulars. But there had been no definite leakage from official minds this time, such as has often occurred.

It was only the teacher-members of the House of Commons, therefore, who were not surprised by the terms of the Bill. Those who expected the London County Council to get the power under it were astonished; those who wished the power not to rest with the Borough Councils were amazed. But the teacher-members of Parliament, being sure beforehand that a Bill which did not give the power to an authority directly and specially elected for the purpose, and for that purpose alone, must be a bad Bill, were not surprised; yet even they hardly expected so unsatisfactory a set of proposals, and this feeling found vent in the very determined and disgusted way in which Mr. Gray and Dr. Macnamara attacked the Bill.

The first reading debate occupied nearly four hours, and there was not one speech, except that of Sir William Anson indeed, which can be said to be a speech really in praise of the Bill. Ministerialists did not praise it, the Opposition condemned it; it fell still-born. The reasons for this will become evident from the following outline of the Bill.

The first clause applies, so far as it is applicable, the Education Act of 1902 to the metropolis—that is to say, the powers and duties of the Local Authority under that Act become the powers and duties of the Local Authority for London. Board schools, voluntary schools, higher education, rating, etc., are to be dealt with in London as though London had been an area included in the Act of last year. The chief difference is in the constitution of the Local Authority for London, and provisions with regard to that make up six-sevenths of the Bill, which is only four pages in length.

The Education Committee of the Local Education Authority for London (which latter is nominally the London County Council) is to be constituted as follows:—Ninety-two members; thirty-six of them to be members of the London County Council, thirty-one to be Metropolitan Borough Councillors, twenty-five to be appointed (as experts) by the London County Council, from outside the Council, if the Council so pleases. On the first Education Committee there are to be five members of the present School Board.

The worst part of the Bill (though the foregoing is very unsatisfactory) lies in the proposals for the management of the public elementary schools. "The Council of each metropolitan borough shall be the managers of all public elementary schools provided by the Local Education Authority (that is, Board or Council schools) within their borough, and, subject to any general directions given by the Local Education Authority and to the power of that Authority to determine the number, qualifications, and salaries of teachers, shall exercise and perform the powers and duties of management as respects those schools, including the power of appointing and dismissing teachers in those schools, and the custody of the building." But if any dispute arise about the power or exercise of power of a Borough Council under the above clause, the Board of Education is to step in to decide, and may authorise the London County Council to take over the powers and duties of the erring Borough Council.

Now that clause, it is contended, will make for favouritism, nepotism, and perhaps corruption, the past history of the London Vestries, which were succeeded by the London Borough Councils, being remembered. And this fear is reinforced by the next clause, which provides that the selection of sites for schools is to be with the Borough Councils. These Councils swarm with local builders and land speculators, it is said, and jobbery and mutual backing of each other's plans and pockets are sure to ensue.

Altogether the Bill is most unsatisfactory, and even dangerous to London education. It was hardly a day old before speculation was rife as to how it would be altered, or when it would be withdrawn. Nobody praises it, nobody appears to like it; it has many enemies and few friends. How such a Bill and also the Irish Land Purchase Bill can be carried between Easter and August is more than the Parliamentary quidnuncs can imagine. The Bill seems well on the highway to repeat the performances of the abortive Bills of 1896 and 1901.

Meantime Parliament rises, and splits into atoms that part to the four winds, for a holiday of twelve days. The light in the clock tower will leave Big Ben lonely for that period, and the fiery cross against the Bill will illuminate political London in its stead.

---

REPORT OF THE ROYAL COMMISSION ON UNIVERSITY EDUCATION IN IRELAND.—In reply to numerous inquiries as to the possible outcome of the Commission Report, we are requested to state that nothing is yet known of the intention of the Government in this matter, and that, even if any changes are to be introduced, due regard will be had to the cases of those who have entered on their university career, and a considerable time will be allowed them within which to complete their courses under the ordinary regulations.

---

THE Annual Exhibition of scholars' work from the Board Schools of London will be held at the Examination Hall, Victoria Embankment, W.C. (adjoining Waterloo Bridge), on Saturday, 9th May 1903, and on the following Monday, Tuesday, and Wednesday (11th, 12th, and 13th May). The Exhibition will be opened by Lord Reay, G.C.S.I., G.C.I.E. (Chairman of the Board), at twelve o'clock noon, and will include specimens of drawings, colour-work, modelling, science apparatus, wood-carving, metal-work, needlework, infants' work, cookery, laundry-work, and housewifery from the day and evening schools, and also work from the schools for the blind, deaf, special instruction, truant, and industrial schools. Arrangements will also be made for various classes at work in practical cookery, laundry-work, etc., during the daytime, and gymnastics, dramatic literature, etc., in the evenings.

BRITISH MUSEUM

# BY MANY HANDS.

*"Quot homines, tot sententiæ."*

**Is it Fear at Brunswick?**

JUST on the eve of the Conference of the National Union of Teachers comes a telegram from the "Fatherland," which will surprise many of those who intend to assemble at Buxton. The German Teachers' Association intended to hold its yearly meeting at Brunswick at Whitsuntide, and, like careful people, they have been making their arrangements betimes. These arrangements have come to a sudden end, for the local authorities have informed the managing committee that "according to Brunswick law women are not allowed to be present at any public meetings." Here is a thunderbolt launched against the "better half" of the community. What consternation it must have caused in the great camp of the *Lehrerinnen!* We have waited, hoping that the report would be contradicted; but nothing of the sort has been done, so we must assume that the statement of Brunswick's law is correct. It is evident that in Brunswick woman is intended to be and to remain, willy-nilly, the *Hausfrau*, and nothing more. At Buxton, woman, individually and collectively, will be much in evidence. As representative, committee-woman, member of the Executive, hostess, speaker, and even hearer, the weaker sex will make its weakness duly felt. What would the National Union of Teachers be without its women workers? The bare thought sends a shiver of dread through the nerves of the sensitive male creature. *Absit omen!*

* * *

**Or Misogyny?**

SOME of the most patient and most successful builders of the strength of the Union have been found among its women workers, and some of its most eloquent speakers are to be found among them to-day. Veritable Chrysostoms—golden-mouthed—are these! But imagine their fate in Brunswick! "Seen and not heard" is too lenient a rule in that strange land; for, so far as public meetings are concerned, they must be neither seen nor heard. What becomes in Brunswick of the Dorcas Meetings, the Browning Societies (or their equivalents), the Women's Liberal Associations, or the (German) Primrose Leagues, the Slate Clubs, and the Societies for the Propagation of European Dress among the benighted (and scantily-clad) heathen—in all of which woman plays the chief part, and plays it well? Unhappy Brunswick! thus deliberately to deprive itself of all the ameliorating influences that woman can exert on public life. Ungallant Brunswick! to hem in the life of woman between the walls of the nursery and the kitchen. We suspect that the proposer of this law was a misogynist—a woman-hater—a bachelor, confirmed and unrepentant. One gleam of comfort shines from this report. Mere man, weak and powerless to make headway against the floods of female eloquence that may threaten to overwhelm him, while resigning himself to the inevitable defeat, may ease his burdened soul by murmuring, "Oh! go to Brunswick!"

* * *

**A kindly Critic.**

THE "glaneuse" of the *Journal des Instituteurs* has been taking the *Practical Teacher* to task for its criticisms of Mr. H. G. Wells's remarks on education in England. His description of the "smart" lady who sees her children for a hurried minute or two in the nursery once a day, or every other day—to whom the little ones and their education are but a jarring detail in a life of pleasure and admiration-seeking—has struck the imagination of Mme. Sage, who is disposed straightway to pity the lot of the well-born infant. She adopts Mr. Wells's fulminations against the use of slang, with ardour, probably because in France, as in England, the use of "argot" is becoming excessive, and threatens to undermine the purity and strength of the language. But in assuming that Mr. Wells's "humorous and somewhat paradoxical talent" is not to the taste of the teachers of England, Mme. Sage is making a leap that is by no means justified: a former teacher and student himself, he is probably more extensively read and enjoyed by teachers than by any others. But the *Practical Teacher* is warned. It has at least one discriminating and critical reader over-seas in the person of "La Glaneuse."

* * *

**Prix de Vertu.**

THE "prizes for virtue" which are awarded by the French Academy are familiar to most of our readers as a fact; the actual awards are perhaps less familiar. They are at times sufficiently striking, throwing light on acts of self-devotion which are all the more astonishing from the conditions under which they are performed. One such is the work of Mdlle. Jeanne Schneider, a teacher, which has received a fitting recognition at the last distribution of these prizes. She is herself blind, and has founded and directs a school for the blind. With but feeble resources, she collected at first half a score of little blind children. She has now sixty seven dependent on her bounty. They receive elementary instruction; and the horrible isolation of their lot is eased by their being taught some occupation which will later enable them to live, and even while learning makes them feel as if they are not entirely cut off from the world. The valiant blind directress not only teaches, but feeds and dresses her unfortunate pupils, and is always ready to seek out and take care of any blind child of whom she hears. How does she do it? It is a miracle of charity, says the report which brought her name before the Academy as a fitting recipient of a prize. Most people say that virtue should be its own reward; none will cavil at the prize of 1,500 francs which falls to Mdlle. Schneider. If ever a "prize for virtue" were justified, it is this one.

* * *

**On Hand-writing.**

MANY people must have been struck by the character of foreign handwriting, by the marked difference between it and the average English writing. The twists and twirls, the elaborate flourishes and curling terminations, of French or Spanish or German handwriting are in strong contrast to the unadorned English variety. One of our French visitors has been raising the point among his compatriots, in describing his experiences in England. He finds our style of writing in schools practical and rational; for he sees that it is the easy running hand employed by all in practice, aiming solely at legibility and not at elegance, only enlarged slightly for the purposes of teaching. And he asks his countrymen if this is not a more rational method than the minute study of a style which is useless in practical life, and whose sole patrons are the engravers of visiting-

cards (who, by the way, write it backwards), writing-masters, and teachers, who use it only in their classes. We think like M. Bocquillon, and approve of the change to upright legible handwriting, as against the elegant, illegible Italian hand which used to prevail in England, as it still does on the Continent.

* * *

**Backwards or Forwards in History?**

IT is the old question once more on the carpet: Shall we teach history by beginning with the present or with the remote past? Is the head or the tail the best starting-point? It would perhaps be as well to determine which is the head and which the tail. But without settling that necessary point, a discussion has been going on in the *Manuel Général* on the subject. "*Faut-il enseigner l'histoire à rebours?*" and we can't help thinking that the result of the discussion is the correct one—"That it is a great error to suppose that children can understand contemporary social facts in all their clearness and simplicity; that these facts are but the development of simpler and cruder facts, whose origin is to be sought in primitive times: *ergo*, let us begin history by going back to primitive society, or, in other words, by tracing the development of the present from the past." Such a view puts out of court at once the project of lessons on our own times, the mechanism of government and of social organisations, as the necessary foundation of historical teaching. They are the coping-stone, not the basement.

* * *

**Voltaire on History.**

IN this connection it is interesting to read what Voltaire said on the subject to D'Alembert, who was, we believe, the first to suggest the "backwards" treatment. "I am not quite sure that it is good to take things backwards. I can well understand that there is no great risk of deception in taking backwards the praises that cowardly rascals shower on powerful ones; but if you wish to begin by the seventeenth century before knowing the sixteenth and the fifteenth, I refer you to the 'Conte du Béliér,' who said to his comrade, 'Begin at the beginning.'

"I want to know how the Jesuits were established, before learning how they brought about the assassination of the King of Portugal. I want to understand the Roman Empire, before seeing it destroyed by Alboin and Odoacer. Not that I disapprove of your idea, but I prefer my own, although it is a common one." In which, allowance being made for the specially Voltairian illustrations and the way of putting it, there lies, we believe, the gist of the whole matter.

## NOTES FROM THE NORTH.

**Scottish Class Teachers' Congress.**

THE fourth biennial Congress of the Scottish Class Teachers' Association was held in Stirling on Saturday, 27th March. In every way the functions passed off most successfully, and the committee of the Stirling Association are due the warmest thanks of the class teachers of Scotland for their great and unwearied exertions. The President, Mr. W. H. Morrison, Greenock, in his opening address said it was incumbent upon the class teachers as teachers and educationists to use to the utmost the present opportunity of directing the attention of the people of Scotland to educational reforms, and as specialists in education to inform and mould public opinion on many important topics in connection with the proposed new Bill. He referred at some length to the causes of the scarcity of teachers. The two principal of these were the qualifications and training of teachers, and the lack of promotion and want of prospect in the profession. He deprecated the division of teachers into the two great classes, university and non-university, as introduced by Circular 329. This circular would lead them to believe that educational hewers of wood and drawers of water were to be introduced. Dr. Douglas, M.P., contributed an excellent paper on Scottish Educational Reform; but as we have already dealt with this subject as referred to in Dr. Douglas's pamphlet, it is not necessary to recapitulate the chief points.

* * *

**The Rural Class Teacher's Prospects.**

PERHAPS one of the most interesting papers delivered at Congress was that of Mr. James Clark, Denny, who took as his subject, "The Rural Class Teacher." In an address scintillating with flashes of humour, he showed the lot of the rural class teacher to be by no means an enviable one. The position of the schools in rural districts was that they were rapidly being staffed with lady teachers, as it was impossible for Boards to obtain male teachers. So great was the desire for untrained females, that during the past seven years they had increased 55 per cent., whereas during the same period the untrained male had decreased by 3 per cent.; so that at the present time, of every hundred certificated teachers in Scotland there were sixty-one females and thirty-nine males. The great and frequent changes of the *personnel* of school staffs came in for some severe strictures. In the coming Education Bill something will require to be done to extend areas, or the proud position occupied by Scottish education in the past will be but a remembrance. The hope of promotion, which seems to be the root of the whole problem, will then be real. Mr. F. Goldstone, Sheffield, President of the N.F.A.T., conveyed the heartiest greetings of the 10,000 members of that association to their brethren in Scotland. Mr. Goldstone, who was also a delegate at Aberdeen Congress, made a vigorous and able speech, in which he warned Scottish teachers not to be carried away by the idea of uniformity, which he thought was the glory of officialdom. What was good enough in the present Education Act for England was not good enough for Scotland.

* * *

**The New Code.**

THE new Scotch Code contains numerous changes, as was to be expected from the circulars recently issued by the Department. The circular on the supplementary courses, of which we gave a *résumé* in last month's *Practical Teacher*, has been embodied in the Code. It is not meeting with very general acceptance, as it is felt that specialisation is being introduced at too early an age—namely, twelve. Already signs are not wanting that the Institute are prepared to make representations to Parliament on the subject. The question of age classification, which in Scotland has run to seed, is more vigorously pressed in the Code than one expects in the era of freedom and liberty of classification introduced some years ago. There is something to be said for the Department's attitude with regard to the high ages in the infant and junior divisions; but it is largely a question of accommodation in some of the urban centres, and for this reason many consider the new Code an "urban" rather than a "rural" Code.

THE following note in the New Code with regard to the instruction of pupil teachers is likely at no distant date to have far-reaching consequences:—

***The Pupil-Teacher Question.***

"Their Lordships have under their consideration a modification of this schedule, with a view to making more suitable arrangements for the instruction of pupil teachers in subjects of secondary education on lines which conform to the requirements of the Leaving Certificate Examination." It will thus appear that the work of the pupil teachers is to be more specialised, and no doubt this means the abolition of the King's Scholarship Examination. The fact that this examination does not admit pupil teachers to the university shows the necessity for its abolition; for although pupil teachers may be successful, they have still the University Preliminary to pass before they can be reckoned as university students.

THE Committee of the Institute has been considering the proposed new Education Bill for Scotland. They have agreed that the Central Authority should be the Education Department, assisted by an Advisory Council selected from the various educational bodies, and that this Authority should be located in Edinburgh. With reference to the Local Authority, they recommend that it should be elected *ad hoc*. The administrative area best calculated to promote the best interests of education would not be one defined by geographical considerations. The county in many cases is not an ideal area, but in view of the fact that the machinery for county or parish government is already in existence, it is believed that the best area is the county area or county district. It was agreed not to bind the Institute either to the one or the other scheme.

***E.I.S. Doings.***

IN view of the approach of the septennial period for revision of the Superannuation Act, greater attention is being given to this subject in many quarters. It is hoped that the new Bill will take something to do with superannuation. The Institute proposes that a scheme should be adopted for all classes of teachers in Scotland, the Government, the local authorities, and the teachers all contributing equal amounts to the fund in the proportion of the teachers' salaries, the pensions being in the same proportion. All these proposals have yet to come before the General Committee in May.

***Superannuation.***

THE voting papers for the annual elections will be in the hands of the various members early in May, and already the greater number of nominations for the General Committee, the Presidency, and Vice-Presidency have been made. A wide interest is being taken, and the result, no doubt, will be a great influx of new blood. The importance of having a strong executive is emphasised by the fact that the Institute is on the eve of great changes, both with regard to its internal management and its increase in membership. Should the larger area adumbrated in most speeches on the new Bill find acceptance with the Government, there will be a greater cohesion of the various teachers of Scotland, primary and secondary, with the result that the Institute will become a stronger and, we hope, more influential body with the Department. The present time, therefore, may be a turning-point in the history of the Institute. R. G.

***E.I.S. Elections.***

## THE N.U.T. CONFERENCE AT BUXTON.

AS the date of Conference drew near some two thousand teachers began to wend their way towards Buxton. Most of them had been duly elected to represent one or other of the four hundred and thirty-two associations of which the National Union consists; and one went to represent the *Practical Teacher*, and to endeavour to give the numerous readers of that magazine an idea of the proceedings of the great educational gathering.

It is impossible to add to the splendid description of Buxton and its neighbourhood from the pen of Mr. Souden, which appeared in our last issue. As darkness had set in when our representative approached the town, he was unable to compare his first impressions of Buxton with the account given, but the bracing nature of the air was amply illustrated by the snow-covered landscape which met his eyes on pulling up his blind the next morning.

His first visit was to the reception rooms in the Town Hall, where structures that looked like witness-boxes had been placed on one side to make room for desks, pianos, and other articles which are included in the heavier part of the equipment of a school, while a brisk trade in dolls seemed to be proceeding on the platform. In one of the side-rooms crowds were thronging to buy tickets for the various excursions which are organized to form a contrast to the more serious labours of Conference, while numbers were adding their names to the lists of intending partakers of College Club dinners and other social functions of which the notices covered the walls. Descending the staircase, which had been enlivened by a well-arranged display of maps by Messrs. Stanford, our representative made his way to the entrance of the Pavilion, where, as he passed through the spacious corridors set apart for the publishers' exhibition, he overcame the strong temptation to linger by deciding to devote a special section to the wonderful collection there displayed, and so he pressed on to his seat in the crowded Conference Hall.

### THE FIRST SESSION.

The first session is generally regarded as purely formal; but yet it serves an extremely important end, for it puts the work of the Union into connection with the outside world. On this occasion it gave an opportunity to representatives of the local municipal and religious bodies to welcome Conference to Buxton, and show their sympathy with the teachers' work, while representatives of Continental, Scotch, and Irish associations of teachers attended and gave proof of the unity which should characterise the aims and aspirations of teachers in all parts of the civilised world.

Long before eleven o'clock the seats in the body of the hall were filled, and soon the President, Vice-President, and other members of the Executive, together with the notables of the town and others, appeared upon the orchestra, which served as a platform. The reception of Conference by the Chairman of the Buxton Urban Council and other representatives of the town was characterised by less formality than is usually the case, though we are bound to say it was in no way less hearty. Instead of a Mayor or Lord Mayor in robes and chains of office, the function was performed by the Chairman of the Urban Council in a tourist suit; but he appropriately expressed the pleasure it gave him to extend the heartiest possible welcome to Conference, and said how the people of Buxton were flattered by the selection of their town. Conference, he continued, was used to towns of greater commercial importance, but could not find one of such great natural beauties, or so suited for the recruiting of health, which was so necessary to all, and of special importance to teachers; and after a few words on the importance of the office of the teacher, he promised that his council would do all in its power to make the visit pleasant.

He was followed by the vicar of Buxton, who in a speech of great vigour and freshness repeated the welcome, and after referring to the schools with which he had been connected, declared that "the teachers of the country as a body are rising magnificently to their opportunity."

After a speech by the Rev. Gerald Ford, welcoming Conference on behalf of the Free Church Council, in the course of which he claimed that the first elementary school was established by Dissenters, and pointed out that Dr. Sacheverell had attacked the Dissenters because they were drawing the youth of the country away from the church colleges, a few words of welcome were added by Mr. J. W. Briggs, H.M.I., and Dr. Little, the well-known head-master of Buxton College.

Mr. Allen Croft, the President of the Union, then moved a resolution thanking the previous speakers for their welcome and for their kindly words of appreciation and advice. This was seconded by Mr. Blacker, who was particularly glad to see the representatives of the churches uniting in giving a welcome to the teachers, and expressed his regret that education should so often be made the arena of sectarian strife. In the course of his remarks, however, his metaphors got somewhat mixed, and he said, "When we come down to the bed rock of the child, we see a vista."

After the Chairman of the Urban Council had acknowledged the vote, Mr. Allen Croft took the chair, and declared the meeting open for Conference business.

In moving that the minutes of the Bristol Conference, which had been printed and circulated, be signed, Mr. Francombe exhorted members to be brief in their remarks, and pointed out what a large amount of oratory was boiled down to a few lines in the minutes, which alone constitute the permanent official record of the proceedings.

Mr. Croft then expressed his deep but mixed feelings in vacating the chair, and proceeded to instal Mr. Harry Coward as his successor.

The first act of Mr. Coward, after thanking the Union for placing him in the proud position of President, was to make a touching reference to the deep loss the Union had sustained by the death of Mr. Graves, and the whole assembly showed its respect for the departed ex-President by silently rising from their seats. The best thanks of Conference were then tendered to Mr. Croft for his past services as Vice-President and President, and he very suitably acknowledged the vote.

The first session was brought to a close by the reception of deputations. The list this year was a very long one, and had each member of a deputation been allowed to express fully the kindly sentiments of his association towards the N.U.T., no one knows when the session would have ended. The President, therefore, very wisely selected one from each group, and promised that the others should have an opportunity of being heard at the dinner or on another occasion. M. Mory dwelt upon the importance of the study of foreign languages as a factor in the promotion of that international peace and friendship which all teachers so much desire, and described the progress of a polyglot circle which he has founded among primary teachers in the French capital. His question whether any similar movement was proceeding in England remained unanswered; and although we know that many teachers do devote a considerable amount of time to the study of modern languages, we know of no organized plan by which they endeavour to afford one another mutual assistance in this direction.

It was with feelings of unmistakable pleasure that Conference welcomed the deputations from Holland. Misled by the statements of Continental papers on the subject of the late war, the Dutch teachers had thought it their duty to refrain from sending deputations to our Conferences; and we hope that the presence of the Dutch teachers at our Conference this year is a proof that all bad feeling has passed away, and that, having considered the recent struggle in its true light, our Continental neighbours judge that our part in it was not an unrighteous one. A heavy responsibility rests upon teachers for the training of their pupils in feelings of consideration and respect for people of other countries, and this cannot be done unless teachers entertain those feelings themselves. It consequently gave the English teachers the greatest possible pleasure to extend the right hand of fellowship to their Dutch colleagues, and it was interesting to note that the President, in referring to the deputations from abroad, spoke of them as "not foreigners, but friendly neighbours from the Continent."

The Educational Institute of Scotland was ably represented by Mr. A. T. Watson, M.A., its President, and Miss Elizabeth Fish, L.L.A. The former expressed the good-will of the Institute, and its delight that the President of the N.U.T. for the coming year should be one of its Fellows. Mr. D. C. Maher, B.A., spoke on behalf of the Irish National Teachers' Organisation, and pleaded for help in its endeavour to put Irish education on a satisfactory footing. He aptly compared the two islands to a big brother and a little sister, a comparison which, we believe, expresses his true appreciation of the relations between the two parts of the United Kingdom, although he chanced to make a remark about himself and "*the other foreign delegates.*"

The presence of representatives of the Teachers' Guild was taken as a welcome token of increasing unity between the different parts of the great teaching profession, while Mr. Booth expressed the appreciation of the great Co-operative Union for the work of the N.U.T.

The irrepressible Mr. Van Dam was also present; but as he represented no association, and time was somewhat advanced, he was not allowed to keep the audience amused for his usual space of time.

The formal vote of thanks to the deputations brought the first session to a close.

## SECOND SESSION.

The formal business in the shape of the adoption of Standing Orders and appointment of Scrutineers was soon disposed of, and the meeting settled down to hear the President's address. Naturally enough, the Act of 1902 occupied the most important place in that address. Speaking of the measure, Mr. Coward said:—

> "The Act is, in my opinion, a far less perfect measure than would have been possible for the Government to produce. A grand opportunity has been missed in not once for all placing the whole of our educational system under public representative control, with no religious disabilities for either teachers or children; under bodies elected for educational work alone, acting over areas sufficiently large and with powers wide enough to induce men and women of ability to find seats on them who would act altogether above mere parochial, partisan, or sectarian influences. The country owes a debt of gratitude to the larger School Boards for what they have accomplished during their term of existence; and I say this notwithstanding that some of their administrative acts and the short-sighted and oppressive character of many of their far too numerous regulations have borne hardly on the teachers whom they employed. These larger School Boards have, however, recognised the greatness of their work, and have tried in most cases to act up to a high conception of the duties imposed upon them. With the passing away of these bodies I desire to place on record my appreciation of the work they have accomplished.
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> "The provision of buildings suitable for schools, spacious, well warmed and lighted, properly ventilated, with good playgrounds and sanitary arrangements; the release of the boy and girl pupil teachers from their drudgery, and providing for their instruction in properly equipped pupil-teacher centres; arranging that the children in their schools should be taught in smaller classes by well-trained adult teachers; the care for the exceptional children, the deaf, the blind, and the mentally deficient; the widening of the curriculum for both boys and girls; the fostering of evening continuation schools; the encouragement of physical training and swimming; the establishment of higher grade schools for the cultivation of the best intellects of those who have passed through the ordinary schools, will mark for all time the School Board era as one of enlightenment and progress, and provide a useful starting-point from which the new authorities can take up the work and advance still further."

Having shown to what extent he was disappointed with the Act, Mr. Coward expressed his opinion that it is far more profitable to magnify the possibilities for good than to dwell on the defects of this latest educational legislation; and first he declared his joy that whereas more than half of our primary schools had hitherto had to depend for their local support upon charity—"a very weak prop in a large number of cases," now the whole of the schools are boldly placed upon the rates, as well as upon the taxes, for their maintenance; and he felt sure that the corollary to this, complete public

control, the absence of which had aroused such antagonism to the measure, will in due course inevitably follow.

He then went on to deal with the work of the councils in co-ordinating the various branches of education within their areas:—

> "The co-ordination of the various parts of our educational system, the whole controlled and financed in each locality by the same authority, has long been advocated by educationists as the best means of securing the linking up of school to school, the making of an easy road for boys and girls to travel from one grade of school to another, and the fitting-in of the curricula of the various classes of schools with one another. The new Act gives considerable power in this direction. Great as the work may be which county and town councils have had to perform hitherto, this new work of education dwarfs it into comparative insignificance, when we remember that the future prosperity, and perhaps even existence, of the people of this country as a great nation depends upon the manner in which these duties are carried out. It may fairly be expected that these bodies will rise to the occasion; that their ablest members will devote their energy and ability to the work, rising superior to all temptations to administrate in the interests of creed, sect, or class, having the single aim of so perfecting the machinery at their disposal that every child shall have placed well within its reach the highest education—mental, moral, and physical—for which God has given it the capacity. While I am glad to note that the councils are, almost universally, reserving a large majority of the places on the Education Committees for their own elected members, I am quite sure that the Act has provided wisely in securing that others specially acquainted with educational work and needs shall be also included. Such a combination will make more easily practicable the real co-ordination of educational effort, by enlisting the enthusiasm and co-operation of bodies outside the councils interested in the work of different kinds of schools. Where these extra members are permitted—as the Act provides—to be really the *representatives* of the bodies for whom they are supposed to act, a long step will have been taken towards success."

Passing from the consideration of the primary school, the President pointed out what a grand opportunity presents itself in the organization of schools for pupils above the ordinary primary school age. The larger School Boards have made a good beginning in this matter, and nearly seventy higher-grade schools in vigorous working condition will be handed over to the new authorities as going concerns, and it will be impossible for Mr. Cockerton to prevent the extension of their work and usefulness. And here Mr. Coward advocated the establishment of such schools at convenient centres in rural districts, not only as an act of justice to meet the demand of dwellers in the country, but as an act of policy to stay the migration into the towns. "Setting up," said he, "such schools in rural districts would be much more calculated to deter people from leaving our villages than any attempt to restrict the curriculum of the rural school, whether under the guise of adaptability to the surroundings, or for any other reason."

Mr. Coward's plan of co-ordination then leads to a branching out—the pupils with a scientific bent, and preparing for a commercial life, would go to the technical school, others with literary tendencies would go to a school of the grammar school type. "Above these again would come the university college and the university. A complete system of schools, joined together by their curricula, and, as far as possible in their management, would thus be secured, from the primary school to the university."

The new authorities will link up these various kinds of schools, creating them where they do not already exist, and make it easy for boys and girls to pass freely from one to another irrespective of creed or class, and will provide a liberal number of maintenance scholarships. In showing that this is the plan in America and on the Continent, the speaker quoted one of the statutes of Canton Zurich: "The elementary schools must be in direct and organic connection with the institutions for higher education." He omitted to point out, however, that in Zurich no class prejudices restrain people of the highest rank from sending their children to the elementary school.

The President next dealt with the London Education Bill, and condemned it in all its leading points. While the Bill professes to give the general control of education in the metropolis to the London County Council, that control is illusory, except in the matter of raising money for administrative work. The proposed constitution of the Education Committee is "preposterous," and certain of the essential details of the scheme are "extremely grotesque." Nothing could be more unwise than the proposal to make the Borough Councils responsible for the selection of sites, and for the appointment and dismissal of teachers; for, in the first case, they are not likely to be influenced by educational considerations, and are not likely, because of the already high rates, to look ahead in the question of selection of sites in the way now necessary in London to meet future requirements. In the second case, local influences militate against selection on purely educational fitness, and the plan will "tend to divide London teacherships into twenty-nine watertight compartments."

"The scheme of the Bill is one that cannot be modified effectively by striking out the borough representatives from the Committee, or by increasing the representation of the County Council. The County Council have at present such an enormous amount of work to do that the administrative work of the Education Committee would remain in the hands of the co-opted members and of the officials. That would make London's apathy in education more pronounced." And Mr. Coward went on to state that in his opinion "no Bill for the establishment of an education authority for London can be deemed satisfactory which does not provide for the creation, *through direct election of the London ratepayers*, of an authority administering London as a whole; controlling all grades of public education in the metropolis; devoting itself exclusively to the work of educational administration, and perhaps (if it be felt advisable) invested by statute with limited powers of co-optation."

The question of the supply and training of teachers occupied a much more prominent place in the President's speech this year than it has ever done before, and indeed the whole Conference seemed fully alive to the importance of this subject. Mr. Coward congratulated the Board of Education on establishing the Committee now sitting to inquire into the subject of pupil teachers, although he paused to ask why one of the representative leaders of the Union was not offered a seat upon it. He hoped that the Board of Education would alter its regulation allowing a boy or girl to count on the staff of a school as a recognised teacher for thirty children, and so remove the temptation from school authorities to look upon pupil teachers as a cheap means of staffing the schools, instead of considering them as learners in need of training and teaching.

> "It may," he said, "be placed to the credit of the larger School Boards that they have for years recognised their duty in this respect; they have declined to allow these boys and girls, at least during the earlier years of their engagement, to count on the staff at all, and have provided efficient instruction in well-equipped special schools for half their time, the other half being devoted to the practical work of the school under the supervision of experienced adult teachers. In the Voluntary schools generally, and almost entirely in the Board and Voluntary schools in rural districts, pupil teachers have not had these advantages, and so have been heavily handicapped in their professional career. There is now an opportunity for this inequality to be removed. Efficient instruction, either in pupil teachers' centres or in secondary schools, must be given to the pupil teachers in our rural districts; and no pupil teacher should be employed in a school so remote as to make it impossible for him or her to have the advantage of such teaching. Hitherto, pupil teachers have been articled to, and have spent their time in, one particular school. Is it not possible, with one authority over all schools, for them to get experience in more than one kind of school? I think so. A few weeks in the science, the technical, or the grammar school, watching the teaching, noting the methods, teaching, too, occasionally under supervision, would give new ideas, widen the experience, strengthen the character, and make the pupil teacher more anxious to fit himself for a future in any kind of school."

He then pointed out the grave evil arising from a deficiency of training college accommodation to enable the pupil teacher to continue his training at the expiration of

his apprenticeship. At the recent King's Scholarship Examination 2,307 men and 7,872 women passed, of whom only about 1,105 men and 1,834 women will be able to find a vacancy in a training college. "If our training of teachers is to be complete, the number of pupil teachers should approximate to the number required to supply the waste in the ranks of the certificated teacher, plus the additions needed by the natural growth and increase of schools," and training should be provided for all these either in residential colleges, in colleges attached to the universities and university colleges, or even in the universities themselves. After speaking of the religious test for entrance to a training college as "an anomaly in a system of national education," he added: "With the increase of university day colleges having no religious test, it will soon be a question for the residential colleges themselves to consider whether, in their own interests, it will not be wise to throw their doors as wide open as possible."

Mr. Coward then pointed out the need not only of ampler training, but of the provision of a larger prospect of future advancement, higher emolument, and a better position generally for teachers after they become qualified.

> "There must be," he said, "no artificial barriers erected to prevent teachers from passing from one kind of school to another for which they may fit themselves. The humblest pupil teacher ought to feel that the whole course of the teaching profession lay open before him; and provided he has the ability, the energy, and the perseverance to obtain the necessary qualifications, the door of no school should be arbitrarily barred against him. The Inspectorate, too, should be recruited from the ranks of the teaching profession. It seems utterly unreasonable that those who are to visit schools, to watch methods of instruction, to point out deficiencies, to make suggestions for improvement, to examine our young teachers—even in the science and art of teaching—should be almost entirely chosen from among those who have had no previous experience either of schools or teaching; who have to learn the elements of their work after their appointment, sometimes at the expense of injury to both schools and teachers; while successful, well-equipped men and women, ripe in experience, with judgment matured by long, practical acquaintance with every detail of school work, should be passed over. To be a teacher, however well qualified, at least in our primary schools, seems to be almost an absolute bar to appointment as inspector. Even within the ranks of the Inspectorate, as it exists to-day, there is no properly graduated system of promotion. The sub-inspector, however experienced and well qualified, however high his attainments, whatever length of service he has rendered, is hardly ever promoted to the rank of inspector, or even junior inspector. Why should such a state of things exist? Is this also because the sub-inspector was once a teacher? All this is illogical and wasteful in educational economy. The Inspectorate should be the top end of the teaching profession, and appointment to it should be the reward for the successful teacher. Adding this as a tangible possibility to the teacher's career would prove an incentive to perseverance, to study, to excellence of work, right through the ranks of the great body of teachers."

The presidential address, though full of bold, incisive criticism, contained but little in the way of rhetorical illustration and ornament; but referring to the excess of supervision exercised by some School Boards through their inspectors, superintendents, and other officials, there was a metaphor which deserves to be quoted:—

> "It almost seems as though some School Boards deliberately looked at the work of the school through the wrong end of a telescope—the school, the child, and the teacher appear small, distant, and insignificant; while the teacher, expected to peep, with fear and trembling, through the small end, sees the office, the official, the inspector, magnified and important. The real, actual, living work of education, however, has to be done and is done by the teacher; and all the rest is but the machinery, useful and necessary some of it, but only in so far as it serves to assist the teacher instead of hindering or hampering him. The wisest authority is the one which also invests the teacher with authority, and exactly in the same ratio as he is given responsibility will his influence and power for good over the children become."

In appealing for a closer union between all branches of the teaching profession, Mr. Coward condemned the Teachers' Registration Act of last year, and said that "to confine sets of teachers entirely to particular grades of schools is calculated in the long run to produce mediocrity, narrowness of aim, and antagonism, instead of excellence, striving for high ideals, and cordial co-operation." He then quoted the remarks of the Bishop of Hereford, after his experience as head-master of both Clifton College and Rugby:—

> "I should like to see the teachers from the elementary schools, when the occasion arose, apply for and take positions in the secondary schools of the country. Many of them were extremely able and highly educated, and there were many of them whose work would be of the highest benefit to the secondary schools if they could obtain positions in them. He hoped to see teachers passing backwards and forwards, so that the whole system would be welded into one, and not continue to be two systems."

In this connection the Circular of 15th December last came in for strong condemnation as likely to limit the intellectual horizon of training-college students and prevent the passing of teachers from one grade of school to another. As a strong united protest has been sent by the principals of training colleges to the Board of Education, and the Executive of the N.U.T. has also sent a protest, a strong hope exists that the regulation may be withdrawn.

Regretting that time would not permit of his treating of evening schools, individual examination, drill, and other subjects now before the teacher's eye, the President brought his address to a conclusion by a few remarks on the superannuation of teachers, and expressed the hope that the small pension now obtainable from funds supplied by the State and by the teachers themselves might be supplemented by contributions from the localities which, though vitally interested in the question, at present pay nothing towards the object.

At the conclusion of the President's speech, which was loudly applauded, Mr. J. E. Smith (Bristol) proposed a vote of thanks to Mr. Coward for his address, and for his services as Vice-President during the past year. He aptly described the language of the address as calm and dignified, and dwelt upon the self-sacrifice of Mr. Coward, who, in order to carry out his work as Vice-President, frequently closed school at 4.30, caught the London express at 4.45, and although late in returning, was always ready for his work next morning. This was seconded by Mr. Dowding, who referred to the years he had spent as a colleague of Mr. Coward; and after the ex-President had repressed the desire of numerous individuals to say something in support of the motion, it was carried unanimously.

The President then declared the result of the election for Vice-President to be in favour of Mr. George Sharples, who polled the record number of 19,302 votes. Mr. T. Jones, the unsuccessful candidate, polled 13,436. After a few remarks from these two gentlemen as to the friendly nature of the contest, and of their united endeavour to cut down election expenses, Mr. Hamilton was declared to be duly elected treasurer for the ensuing year.

## THIRD SESSION.

On Tuesday morning Conference met at ten, and by that time the large hall was packed. After a few preliminary announcements, the President intimated that the ordinary business, as set out in the agenda paper, would be set aside in order to allow of the presentation being made to Sir George Kekewich. This plan was heartily agreed to, and the ex-chief-secretary was received with rounds of cheering.

The President then said how Conference felt honoured by the presence of Sir George, who during the thirteen years he had been secretary had made a proud record. Three noteworthy changes made during that period were:—(*a*) The abolition of payment by results. (*b*) The introduction of inspection in place of individual examination. (*c*) The grant, instead of being paid as pennies and twopences for different subjects, was paid as a total for the whole school work. As teachers they had also to thank Sir George Kekewich for opening the door of the Board of Education to direct

communication with the teachers and their representatives, for the abolition of the entries on the parchment certificates, and for the beneficent influence which had led to a better feeling between the inspectors and the teachers. These improvements had made school brighter and happier for the children and for the teachers, and made real education possible. It was a record for the Conference that Sir George, with a strict attention to his duties with regard to the public and the Board of Education, should be able to sit on the platform of the N.U.T. Conference. Three years ago it was proposed to make a presentation to Sir George, and an address was prepared, but circumstances made it impossible for the Union to present it or Sir George to receive it. That address, which was prepared in the form of a book three years ago, they had now placed in a case, and begged Sir George to accept.

The following are the words which occur inside the book :—

In Memory of Ten Years of Beneficent Administration.

| 1880. | | 1900. |
|---|---|---|
| Secretary, Education Department. | (Badge of the Union.) | Secretary, Board of Education. |

To their Friend,

Sir GEORGE WILLIAM KEKEWICH, K.C.B., D.C.L.,

the members of the National Union of Teachers express unfailing loyalty and gratitude. They remember how, as Secretary of the Education Department, he broke with the tradition of a cold, repressive attitude towards the associated teachers and their representations; how from the first his ear has been open to their pleas for reform, their claim for due freedom, their cry for justice, and their appeal for aid; how, under his kindly, sage, and liberating rule, old fetters have been struck away from schools and teachers; how, upon the grave of payments according to mechanical results and annual individual examination, has been lifted the fair fabric of free classification, sympathetic, intelligent inspection, and reliable grants in aid; how, so far as in him lay, he has given to teachers freedom to teach their best, trusting them, heartening them, and helping them to realise ideals which before his days seemed "such stuff as dreams are made on," impossible to attain. They recall his noble service in the cause of pensions and superannuation allowances for the aged and outworn, his support to the Benevolent and Orphan Fund, his paternal interest in all that makes for the dignity, liberty, and general weal of the profession. The Executive rejoice to assure him that alike in village school and city class-room, "from Eddystone to Berwick bounds, from Lynn to Milford Bay," the members of the state's great teaching service, schoolmaster and schoolmistress, principal and assistant, old and young, all hold him warmly in their hearts as trusted chief and honoured friend. They feel that the duties of his high office could not have been confided into kindlier, wiser, stronger hands than his; they know that his administration of that office has brought him "honour, love, obedience, troops of friends." Gratefully the Executive bear this testimony, and hopefully they wish him God-speed through long remaining years of distinguished usefulness to education and the state.

Signed on behalf of the National Union of Teachers,
.....1900.

The inscription on the silver gilt plate runs as follows :—

"Upon the retirement of Sir George Kekewich from the post of Secretary to the Board of Education, April 1903, the Executive and members of the National Union of Teachers enthusiastically repeat and emphasise the words of appreciation and gratitude contained in the book here enclosed, and testify to the skilful, faithful, and genial discharge of duty which to the end of his term of office made him a benefactor to the children, a friend to the teachers, and a pilot of educational reform."

The President then handed the case to Sir George Kekewich, and called upon Mr. Yoxall to say a few words.

Mr. Yoxall then compared the present relations between the Board of Education and the relations thirteen years ago, and said that the improvement was due to Sir George's own initiative, springing from a manly desire to hold out the hand of common sense and friendship to the teacher, to secure progress for the children, and freedom for the advance of education.

Mr. Sharples endorsed all that had been said by the President and Secretary, and in the address, and attributed Sir George Kekewich's love of liberty to his being a keen sportsman, and he especially thanked him for his help in the efforts to obtain superannuation for teachers.

Mr. Robert Wild, in supporting the presentation, said he occupied a position which every one present would be glad to occupy. It had been his duty to visit the Education Department both before and after Sir George Kekewich took office, and he deeply appreciated the difference; and although in the latter period deputations did not get all they asked for, yet they had the satisfaction of knowing that every request was carefully considered. Sir George was an educationist from bottom to top, and his efforts for reform had been a blessing to millions of children, whose lives have been made brighter and happier by what he has done.

The President then proposed that Sir George Kekewich be elected an honorary member of the National Union of Teachers. This was seconded by Mr. Blacker, who expressed the pleasure that every one felt that Sir George still had plenty of health and vigour with which to serve his country, and referring to Sir George's parliamentary candidature for Exeter, appealed to all who were able to do anything to do their best to secure his election.

The proposal was then carried with acclamation. Sir George Kekewich then rose to reply, and as soon as the cheering had subsided he thanked Conference for the honours with which he declared himself overwhelmed: first, for the honour of being elected the sole honorary member the N.U.T. possesses; secondly, for the enthusiastic—he would rather say, affectionate—reception that had been accorded him; and thirdly, for the book containing the address, which would always remind him of his relations with teachers. He had "passed" from the Board of Education, but not from the teachers' hearts, nor from the service of the country. In making this presentation the teachers had nothing to hope for from him as secretary; he regarded it as an act of true, unadulterated friendship. The teachers were the best judges of the results that his secretaryship had brought to the schools. He had striven to make schools satisfactory and happy, and the teachers happy. In pursuance of this he had endeavoured to maintain the policy regarding buildings, and had even got into trouble in Mr. Acland's time because he made what was called the "raid on buildings." He had received no lack of appreciations, including addresses from associations of teachers throughout the country, and recognition from men of all creeds and classes. "But," he added, with evident emotion, "there is one body from whom I have received no recognition. From the time that I walked out of the Board of Education at the end of October until now, I have had not a word of thanks from the heads of the Board of Education or His Majesty's Government. I have had no recognition. And in saying that, I do not refer to titles, or honours of that description —I have a contempt for them. I possess one, but that was given me by the Liberal Government in 1895. I am proud of that, and I want no more. But I do think that I might have had a little word of thanks in a blue envelope—something just to put with the numerous addresses and letters of appreciation I have received from other quarters; and I have wondered why I have received no recognition. Is it because I have always been opposed to reaction? Is it because I have always endeavoured to foster goodwill between the teachers and the inspectors? I think that has been called by some people putting the inspectors under the thumb of the teachers. Then, ladies and gentlemen, I have wondered whether it is because I have encouraged a class of school of which you have heard a good deal lately—I mean the 'Cockerton School.' I have been wicked enough to open a 'Cockerton' school—indeed, several of them. Well, I am proud of it; and if my time were to come over again, I would do exactly the same thing. I did not know for certain that those schools were illegal, and those schools have come to stay. They have supplied secondary education in districts where none previously existed. They are, I think, one of the most valuable assets of the new authority."

Sir George then referred to the objections raised to his friendship with the National Union of Teachers, and to his delight at relinquishing "a position which has been attended with worries and annoyances of late years that have been

almost intolerable," while he still had health and strength to work in the cause of the country's education with freedom to himself. He then proposed to say a few words on three points—the administration of the Board of Education; the Education Act of last year; and the Education Bill now before Parliament. With reference to the first, he began by condemning Article 22*b*, which sanctions the examination of individual children at the option of the inspector. This he described as reactionary, and bad for teachers, children, and education alike. If acted upon, the old complaint will arise about cram, overpressure, and unintelligent teaching. Mechanical accuracy may be dearly purchased, and the duty of the inspector is not to see what individual children can do, but whether the school deserves public support; and in elementary schools all examinations are utterly wrong except those of the head teacher. The next point was the selection of the new Senior Chief Inspector, whose ability and qualifications were admitted, but whose appointment over the heads of so many inspectors now on the staff requires more explanation than we have had.

Referring to the Education Act of 1902, Sir G. Kekewich said he rejoiced that teachers have obtained certain advantages, among which he enumerated security of tenure, protection against the imposition of extraneous duties, relief from the one-man manager (although he was sometimes a good one), relief from the three-man manager (not always much better than the one-man manager). These benefits were owing rather to the efforts of the three teacher M.P.'s than to the Bill as it was originally drafted. Speaking of the schools, he said that they were no longer to be supported by charity, though there was little enough of that before; they were to be maintained by the rates and taxes. He sympathised deeply with our Nonconformist brethren, who were compelled in hundreds of parishes to send their children to Church schools; and not only so, but now "he is compelled to pay his rate in order that his child may undergo perhaps direct—perhaps indirect in some cases—proselytising. There are numbers of schools, of course, where nothing of the kind ever takes place—the great majority; but there are some where it does." He then went on to speak of the hardship inflicted on Nonconformists who desired to enter the teaching profession. It is true the Act will allow him to become a pupil teacher in any school. But it is a question whether even that provision will act; and even if it does, the object of these young people is not to remain pupil teachers, but to go forward to be certificated teachers; and when they become that, they find the doors of their own schools and 16,000 more shut in their faces. "Well, ladies and gentlemen," he continued, "I am a Churchman, and I believe there are tens of thousands of Churchmen who think as I do, and who are desirous, at all events in such matters as these, of standing on a religious equality; and I do not know whether what I say is in accordance with your views, but I say we should never rest until we have amended the Act in these particulars. I say that as they stand they are a stain upon the Church and a sin against our neighbours." He expressed great confidence in the County Councils, and hoped they would not rest satisfied until every school in this country was up to the level of a Board school, and until it was absolutely in accord with the building regulations of the Board of Education.

With regard to the Bill of 1903, Sir George Kekewich said he would say little, as it was to be discussed by Conference, but he was absolutely in accord with the letters and speeches of Dr. Macnamara on the subject. The Bill, however, intensified all the evils of last year's Bill, and added a great many more. He had hoped that *at any rate* the Government would have made the London County Council the educational authority; for although he would have much preferred the *ad hoc* authority, he dared not hope for that. He condemned the part of the scheme which would make the teacherships of each borough into a close corporation, and advised teachers who had the chance to marry themselves or their sons and daughters into the families of the borough councillors.

In conclusion, Sir George declared that he would always advocate what he would call "the policy of the child," strive for good buildings in which good education should be given by good teachers, and for maintenance scholarships to enable children to stay at school whose parents could not otherwise afford it. But, he said, education is not everything. Since the bad moral influence of the home was often too much for the teacher to counteract, he would strive to improve the social condition of the children by aiming at good homes, temperate parents, with good wages. "No secretary of the office," he continued, "no officer of the Department, has ever had such a testimonial as this presented to him. I thank you from the bottom of my heart. I know there is one thing that distinguishes teachers from all the other people I am acquainted with,—the teachers do not forget. And if they will still find for me a warm corner in their hearts for the future, if they will think that I have endeavoured to do the best, that I have done the best I could for the happiness of their homes, the happiness of the homes of the teachers and of the children, then I shall be amply rewarded."

### The London Bill.

After this interesting presentation was performed, the meeting proceeded to discuss the Education Bill for London, and Mr. Marshall Jackman moved the following resolution:—

> "This Conference is of opinion that the London Education Bill contains proposals fraught with the greatest possible danger to educational progress, will lead to inefficiency and extravagance in administration, is unworkable, and is incapable of being satisfactorily amended. It cannot be made effective either by eliminating the Borough Council representation or by according to the London County Council a majority of seats on the Committee, since the London County Council members could not possibly devote sufficient time to the Committee's work, which would fall into the hands of co-opted members and officials. Even if those modifications were adopted, therefore, Conference would be compelled still to use every legitimate means to secure the withdrawal of the Bill. While not opposed to the municipalisation of education, where the amount of work to be accomplished makes this possible, Conference believes that the magnitude of London's educational operations is such that no scheme of administration can be satisfactory which does not place primary and higher education under the effective control of one authority, directly elected exclusively for that purpose."

In doing so he stated that the Bill was universally condemned, and, as it now stood, had no friends. He then proceeded to argue that it was no doubt drafted by Dr. Garnett, and showed the great similarity between the constitution of the authority proposed in the Bill and that in Dr. Garnett's recent memorandum. "But," he added, "Dr. Garnett's egg, after passing through the Board of Education incubator, came out a Water Board duckling." He then proceeded to show, by means of statistics based upon the constitution of the Technical Education Committee of the London County Council and upon some of its more important division lists, that the elected members of the County Council already have more than they can efficiently perform, so that the work and influence passed into the hands of the co-opted members and the officials, and that if thirty-six councillors were withdrawn from the council in order to attend to educational administration (in addition to twenty-nine already withdrawn to attend to the Water Board, Docks, etc.), not only will the educational work be ineffectively administered, but the plan will seriously interfere with the ordinary work of the London County Council. As an educationist he objected to the first, and as a politician he objected to the second. He also pointed out the inequality of the amounts of work which the Bill proposed to entrust to the different Borough Councils: while some would have to administer over a hundred departments, others would have but five or six to attend to.

Mr. J. J. Cullum seconded the resolution, disclaiming that the opposition to the Bill was of a political nature, and reminding his hearers of the great difference between the Council of a County Borough and a London Borough Council.

An amendment was moved by Mr. Turner, and seconded by Mr. Despicht, asking that the Bill should be amended so as to make the elected members of the London Council form the majority of the educational authority, and keep the selection of sites and appointment and dismissal of teachers in the hands of the educational authority. He urged that there was no chance of securing an *ad hoc*

authority, and that the most we could do would be to amend the present Bill; and that if this Bill were rejected, London would have to wait a very long time.

Dr. Macnamara then rose to oppose this amendment and support the original resolution. He begged the members of the Conference to unite in desiring to secure for London the best possible authority. He referred to the magnitude of the work of controlling and directing more than 2,000 separate school departments, 20,000 teachers, 1,000,000 pupils and students, involving as it does the expenditure of £4,000,000 of public money. This work is as great as the whole of the work at present in the hands of the London County Council; it is as great as the whole educational administration of Scotland, which requires the attention of more than a thousand School Boards and education committees; and is three times as great as that of Wales, which is in the hands of between three and four hundred different bodies. He then declared that the statement that the County Council was to be the controlling authority was either real or illusory. If it was real, how could the Government propose a plan which would double the work of the Council, after saying that it already has too much to do, and charging its members with megalomania. The proposal would not only kill the School Board, but would wreck the County Council. If the proposal were not real, its effect would be to create a Water Board; and although it might be possible for a small committee to meet and nominate a very good Board, yet as it would not be based upon public opinion its work would come to nought. He appealed to the mover and seconder of the amendment to withdraw it, as the Voluntary schools as well as the Board schools will be better under an *ad hoc* body than under the County Council. His ideal was a body consisting of one member for each of the fifty-eight divisions, together with co-opted members to represent special interests; and he appealed to the Government to bear in mind the now well-known words of Lord Balfour of Burleigh: "So far as Scotland was concerned, he did not believe in any system which did not have its basis on popular election."

The amendment having been defeated, the resolution was carried with one dissentient.

A resolution proposed by Mr. Blacker, and seconded by Mr. Breary, asking for further financial help for the Voluntary schools of London until they should be taken over by the new authority, was unanimously agreed to without discussion.

The President announced the result of the poll for the place of Conference next year:—

| | |
|---|---|
| Portsmouth, . . . | 21,723 |
| Llandudno, . . . | 12,548. |

No doubt the coldness of the weather experienced at Buxton induced many members to vote in favour of a town a little farther from the pole.

### Election of Executive.

The President then announced the result of the ballot for the Executive as follows:—

*District 1* (*North England*).—Harris, James (Barrow), 1,084; Dakers, Andrew W. (Newcastle), 1,022; Hyden, George T. (Consett), 995.

*District 2* (*Lancashire*).—Sharples, George (Manchester), 3,538; Pickles, Arthur R. (Burnley), 1,863; Sparrow, Frederick R. (Rochdale), 1,273; Wright, John (Liverpool), 1,198; *Shawcross, Walter (Manchester), 930.

* Mr. Sharples having been elected Vice-President, Mr. Shawcross is elected a member of the Executive.

*District 3* (*Yorkshire*).—Cleghorn, Isabel (Sheffield), 2,633; Sykes, Thomas P. (Bradford), 2,406; Peaker, Frederick (Leeds), 2,194; Moorby, Arthur B. (Hull), 1,869.

*District 4* (*North Midland*).—Baddeley, George (Burslem), 1,817; Lewis, Robert N. (Langworth), 1,663; Selvage, Annie G. (Louth), 1,546.

*District 5* (*South Midland*).—Rankilor, George J. (Birmingham), 2,142; Macnamara, Thomas J. (London), 2,093; Boulter, John T. (Leicester), 1,639; Flavell, Alfred (Birmingham), 1,445.

*District 6* (*East Anglia*).—Ellery, Thomas B. (Luton), 1,934; Broome, Agnes L. (Ipswich), 1,751; Gale, Francis B. (East Dereham), 1,573.

*District 7* (*South England*).—Sandford, Henry W. (Gosport), 1,626; Candle, Alfred S. (Reading), 1,601; Goodwin, Emma F. L. (Southampton), 1,575.

*District 8* (*West England*).—Butland, Thomas (Newton Abbot), 1,901; Prosser, William J. (Bath), 1,661; Winfield, Albert (Backwell), 1,638.

*District 9* (*Wales*).—Williams, Hannah (Cardiff), 1,677; John, Tom (Llwynypia), 1,603; Lewis, Humphrey (Llangollen), 1,257.

*District 10* (*North London*).—Jones, Thomas H. (Finsbury), 1,704; Thompson, William (Chelsea), 1,396; Cullum, Jon. J. (Finsbury), 1,178.

*District 11* (*East London*).—Blackburn, Fred. C. (West Ham), 2,052; Hurden, William (Bromley), 1,925; Hole, Charles W. (Hackney), 1,886; Crook, Charles W. (Wood Green), 1,678.

*District 12* (*South London*).—Bowers, Thomas F. (Woolwich), 1,766; Burkett, Thomas T. (Clapham), 1,664; Nicholls, William A. (Plumstead), 1,608; Folland, William P. (Peckham), 1,599.

The business of the session then concluded.

The fourth session was private, and was taken up with matters affecting the internal organisation of the Union.

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On Wednesday morning Conference opened at half-past nine, and the President called upon Mr. Sharples to move the following resolution, which was down in the name of Mr. Robert Wild, who had prepared a masterly paper on the subject:—

> "That this Conference, being of opinion that the present term examinations, as conducted by head teachers in their own schools, provide a reliable test of progress, and supply the scholars with a valuable educational stimulus, protests against all attempts to revive the Annual Examination System, which, whilst in operation, was admittedly detrimental to the progress of true education. Conference also desires to point out that the reports of H.M. Inspectors are practically unanimous in their approval of the present system, and trusts that those responsible for the management of our public primary schools will decline to entertain any suggestions for the imposition of a yearly examination test in either religious or secular subjects."

This was seconded by Mr. Hurden, and Mr. Peaker moved an amendment to it, condemning Article 22 (*b*) of the New Code, and appealing to the Board of Education to cancel it in the next issue of the Code; and this was accepted by the mover and seconder of the resolution. The various speakers united in deprecating any attempt to return to the old order of examinations, and regretted the decision of the London School Board to appoint eight additional sub-inspectors, as well as the fact that many of the new authorities are advertising for inspectors. The discussion was to the point, and the resolution was soon carried.

### Register of Teachers.

Mr. A. R. Pickles, B.A., then moved, and Mr. J. Wright seconded:—

> "That this Conference, having considered the Order in Council regulating the registration of teachers, protests, in the most emphatic manner, against the injustice which is inflicted on the teachers in primary schools of the country by the introduction into the Register of two lists.
>
> "Further, Conference considers that the exclusion of primary teachers possessing those academical and other educational distinctions necessary to qualify for admission to Column B, until they have worked for twelve months in a school other than elementary, is grossly unfair to the teachers concerned, and is likely to mislead the public.
>
> "Conference also calls attention to the inadequate and disproportionate representation of primary teachers on the Registration Committee.
>
> "Conference therefore urges the Government to remove these objectionable regulations by the issue of a supplementary order."

Mr. Pickles had carefully worked up his case, and supported it by numerous quotations from authorities who were opposed to the cleavage between teachers in different grades of schools. Mr. Cook, in supporting it, called attention to many things which had been done to separate the teachers in primary schools from those in secondary schools, among which he emphasised the Circular to Training Colleges, which puts hindrances in the way of students working for degrees. The Rev. V. Pearson, who represented the Teachers' Guild, said that the expressions of friendship sent by his organisa-

tion were no empty sign, that secondary teachers do not want to exclude primary teachers, and were anxious to strike out the words "other than elementary" from the description of the school in which a teacher must have had experience in order to qualify for registration. He believed that the bridge which was to cross the gap between primary and secondary teachers must be worked at from both sides. Mr. Cartwright said he heard with pleasure this message from the secondary teachers, and expressed his desire for amity, which must, however, be on terms of equality.

The resolution was carried unanimously.

### Staffing of Schools.

Dr. Macnamara then moved, and Mr. Blacker seconded, the following series of resolutions:—

"That, having regard to the fact that elementary schools are no longer to be maintained in any part by the system of voluntary contributions, which was mainly responsible for the scheme for the staffing of schools hitherto fixed by the Education Code, Conference is of opinion that in future the following main principles should guide the Board of Education in making regulations for staffing, and the local education authorities in administering such regulations:—

"(*a*) Except in the small schools, the head teacher should not necessarily be tied to a class. The general supervision of the scholars, the duty of inspecting and co-ordinating the work of the various classes, the responsibility for proper classification and organisation, the admission of pupils, etc., etc., all these make demands of an exacting character; and to tie the head teacher to a class is, educationally, a penny wise and pound foolish policy.

"(*b*) None, except the very smallest schools, should have less than two adult teachers.

"(*c*) It is not educationally expedient to have more than two pupil teachers in a department.

"(*d*) Ample provision should be made for the education of the pupil teacher at some place of higher instruction. The pupil teacher should, moreover, not be engaged in practical teaching work for more than half the working hours named in the Memorandum of Agreement.

"(*e*) Pupil teachers should never be counted at all as effective members of a school staff; they should never be indentured in a school which has not two adult teachers; neither should they be indentured in a school so placed as to make attendance at a place of higher instruction a difficulty.

"(*f*) After an early date no fresh appointments should be made under Article 68, and under no circumstances should there be more than one Article 68 teacher in any department.

"(*g*) In planning a new school no classroom should be built to accommodate more than fifty children, estimated on the eleven feet square basis."

This was moved in a vigorous and incisive speech, illustrated by abundant statistics of the size of classes in Welsh Intermediate Schools (17), English Secondary Schools (22 to 25), France and Sweden (50), Holland, Saxony, and Switzerland (40). So far as administration is concerned, the speaker would place full confidence in Sir W. Anson and Mr. Morant for progressive treatment, and he read the following replies to letters he had written on the subject of the resolutions.

Sir John Gorst, M.P., writes:—

"My dear Macnamara,—I am entirely in favour of raising considerably the scale of staffing in the present Code, as soon as the schools are taken over by the new authority. I think pupil teachers should make their appearance in schools only as learners in the art of teaching, and not as members of the school staff. As regards imperfectly-qualified teachers, they should be got rid of as soon as possible. But Acts of Parliament don't of themselves create teachers, and we have to train a great many more qualified teachers before we can dispense with the services of those imperfect ones now at work in the schools. You will see from this that I concur generally with the resolutions to be proposed at the Annual Conference of the National Union of Teachers."

Sir William Anson, M.P. (Parliamentary Secretary to Board of Education), writes:—

"Dear Dr. Macnamara,—There is much in your proposed resolutions with which I cordially agree, and I fully hope that under the provisions of the Education Act we may soon see a great improvement in the staffing of schools and the education and training of pupil teachers."

Some amendments were moved by Mr. Christian, and seconded by Mr. Arnold, on behalf of the Centre-teachers' Federation. A reference to "the technical training of young children" was inserted among the many duties of the head teacher, enumerated in (*a*); the expression "a department" in (*c*) was converted into "any ordinary department," in order to harmonise with the proposal that certain schools which have exceptional facilities for training pupil teachers may be utilised for the training of a larger number; section (*d*) was amended so as to express a desire that the education of pupil teachers should be carried on "in a pupil-teacher centre of recognised efficiency where such exists, or alternatively at some other place of higher instruction;" and a new clause (*h*) was accepted, that "No teacher shall count on the staff for more than forty children."

The following resolutions were then agreed to unanimously and without much discussion:—

(*a*) Proposed by Mr. A. R. Pickles, B.A., seconded by Mr. Cook:—

"This Conference protests against the regulation of the Board of Education contained in Circular 469, whereby students in Residential Training Colleges, who in 1904 substitute a University Examination for part of their Certificate Examination and fail in it, will only be able to become certificated by passing the Acting Teachers' Certificate Examination.

"This regulation places teachers seeking university degrees at a serious disadvantage compared with other college students, and will consequently greatly discourage those who are seeking university approval of their academic training.

"Conference, therefore, urges the Board of Education to so modify its regulations as to enable collegiate students to seek university distinction without the attendant risk of a heavy penalty."

(*b*) Proposed by Mr. T. H. Jones, seconded by Mr. E. R. Phillips:—

"That this Conference is of opinion that the dismissal as well as the appointment of teachers in all schools should be in the hands of the Local Authority, and that no teacher should suffer disabilities on account of religious beliefs."

(*c*) Proposed by Mr. Dickinson, seconded by Mr. Hirst:—

"That this Conference wishes to direct attention to the hardship inflicted by the non-return of premiums under the Elementary Teachers Superannuation Act, in the event of death before reaching the age of sixty-five; and that the Executive of the N.U.T. be asked to take such steps towards securing the return of premiums in the event of non-survival, as they may deem necessary."

Votes of thanks were then passed to all those teachers and others of Buxton who had laboured to make Conference such a success. The presentation of an address, inscribed on vellum, to Mr. Allen Croft, the ex-President, brought the meeting and the public labour of Conference to a close.

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The sixth session was not open to the press, and Conference again devoted itself to matters of internal policy.

### The Benevolent and Orphan Funds.

On Thursday morning the twenty-sixth meeting of this fund was held in the Pavilion, under the presidency of Mr. South, Chairman of the Central Council. The report of the council showed that the raising of the large sum of £10,000 for a specific object in connection with the fund had been successfully accomplished. For the first time in the history of the fund, the total income had exceeded £20,000. It was therefore proposed to grant twenty additional annuities and twenty new home allowances; while the amount of the home allowances would be increased 50 per cent.—namely, from £13 to £19, 10s., and the special grants to orphans from 2s. 6d. to 3s. 6d. per week.

### Reception of Purses.

On Thursday afternoon, in the handsome and spacious Pavilion which all the week had been the scene of the Conference sessions, public and private, the reception of purses for the Benevolent and Orphan Fund took place. There were no differences of opinion now, no animated debate, no need for the constant clanging of the presidential bell. On all sides crowds of smiling faces, in the front seats the flutter-

ing rows of the purse-holders, on the platform tier behind tier of smart frocks and immaculate frock coats. Now silence, please; the President appears and takes the chair, followed by Mr. Benjamin South, with Lady Newton on his arm. The happiest and most gratifying of all the Conference functions has commenced. First, Mr. Fred Burgiss ascends to the back of the platform and seats himself at the organ to give a masterly recital on the beautiful instrument which the members of Conference have heard with delight on another occasion during the week. Now follows a totally different item, but none the less popular—an address on the work of the funds by the chairman of the Council, Mr. South. After congratulating the subscribers on establishing a record, he passes on to describe in glowing words, and obviously with heartiest sincerity, a little of what has been done during the year to help the afflicted and succour the fatherless and the widow. Proudly he says that if the subscribers have freely given, the Council has freely spent; not a penny has been invested during the year, as it is deemed that our investments already made are sufficient to meet contingencies. Some of the principal items of expenditure are as follows:—On the two orphanages, containing 95 boys and girls, £2,572 has been spent; £1,935 has gone in payment of home allowances to 141 children, orphans of teachers; in annuities to 76 women and 29 men, £3,359 has gone; while giving temporary relief to distressed subscribers has cost the fund £2,780.

After a hearty vote of thanks has been given to Mr. South for his address, a musical item follows, and the audience are left wondering what Mr. Joseph Lycett would be like in his normal condition if he can sing to such effect with a bad cold. The rows of purse-holders now begin to flutter more than ever as they are marshalled for the great ceremony of the afternoon. They file in apparently endless numbers past a gentleman who in stentorian voice announces association, number of members, amount subscribed, and present their purses to Lady Newton, who welcomes each and all with a gracious bow and a kindly smile. Now the cheers rise fast and loud; but notice—it is not the number of subscribers, nor the amount raised, but the *average* per member which wins the applause. Evidently the audience is strong in mental arithmetic, for there is no hesitation in the verdicts, and no mistakes either—the highest averages win the greatest signs of appreciation. Gallant little Buxton, with 40 members and £180, deservedly gets an ovation.

Handsome bouquets are presented to Lady Newton, Mrs. Brown, Mrs. Coward, and Mrs. South, and then Mr. Lycett gives another song, after which the meeting settles down to hear the results of the competitions for the trophy and shield announced. First we are told that the grand total of subscriptions for the year reaches the magnificent sum of £20,263, 10s., an advance of over £5,000 on last year. For the shield given to the association which makes the best average per member, Buxton with £4, 10s. is disqualified under the rule by which the shield cannot be held by the Conference town. The result of this is that Tyneside gets both the shield and trophy, having obtained the highest average, next to Buxton—namely, £3, 18s. 8d. per member, and also the largest aggregate, £1,400.

Votes of thanks are now proposed in suitable words to Lady Newton, to the local committee which has worked so hard to make Conference the success it has undoubtedly been, and lastly to the President for his able conduct in the chair; and after singing "God Save the King," the members disperse with much handshaking, and cries of "See you in Portsmouth."

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The Concomitant Functions included the usual Conference Dinner, a well-attended meeting of the Rurals, the Temperance Breakfast, a Masonic gathering, a Ladies' At Home, and multitudinous College Reunions. Space, unhappily, forbids a detailed account of these highly popular gatherings.

### Centre Teachers in Conference.

The question of the training of teachers occupied a very prominent place in the Buxton Conference, and we cannot pass over the important meeting of instructors of pupil teachers, which was held under the presidency of Mr. A. J. Arnold on the Monday evening. It was announced that several pupil-teacher schools have already been recognised as conferring the right to teachers in them to be registered in column B of the Teachers' Register. Matters affecting the examinations of pupil teachers were discussed, particularly the practice which holds at some colleges of giving the candidates a supplementary examination during King's Scholarship week. No objection was taken to the examination as such, but it was felt that the holding of such an examination in the evening tended to unfit the candidate for the examination during the day by unduly increasing the nervous strain. A difference of opinion arose between the London section and the provincial section over a question of policy; for while all held that the general and professional training of the pupil teacher should proceed *concurrently*, the provincial section contended that this meant simply a half-time arrangement, while the London centre teachers advocate a plan for sending the pupil teacher to centre for two terms in a year, and giving him continuous training in the art of teaching during the other term. Mr. Ernest Gray, M.P., who was present at the meeting, spoke in favour of the London plan.

Mr. Stone, from pressure of other work, was obliged to resign the secretaryship, and Mr. A. L. Cann was unanimously elected.

The president then gave a very able address, dealing with the present position of the pupil-teacher question and the future prospects of the centres.

## THE PUBLISHERS' EXHIBITION.

One practical advantage to be derived from a visit to Conference is so great that it should be sufficient to induce managers of schools to pay the expenses of their teachers who go there—we mean the opportunity of seeing and inspecting all that is newest and best in the way of school books, apparatus, and furniture. The publishers' representatives have perhaps never been so favourably placed as they were at Buxton, where the long, well-lighted approaches to the great central hall of the Pavilion gave them a splendid opportunity of bringing their respective charges under the notice of the teachers.

Immediately inside the entrance on the left was the well-arranged exhibit of Messrs. T. Nelson and Sons; and here a number of illustrations from their various books, printed in colours, mounted together on one card, at once caught the eye, and revealed the perfection to which this firm has brought the art of colour printing. An examination of the books on the show table proved that these were no isolated examples, but that no pains were spared with any of the school books to bring them to the highest pitch in matters of illustration. This was particularly the case with the new *Royal King Primer*, a juvenile book leading up to the *Royal Prince* and *Royal Princess* series. Another excellent series of books shown was the *County Geographies*, readers intended to give children a full knowledge of the county in which they live. Another series that deservedly attracted attention was the modern geographical readers entitled *The World and its People*. The fine relief map of Africa and the wall atlas of Asia were good specimens of the maps produced by Messrs. Nelson.

On the other side of the entrance were some interesting cabinets by Messrs. Brown and Son for illustrating object lessons. Farther on, Messrs. W. and A. K. Johnston were exhibiting some good maps and a useful frame made of celluloid for displaying scholars' work. Messrs. G. Philip and Son had on show a very fine collection of drawing cards and copies, suitable for use with either a pencil, flexible point, or brush. Many useful maps and diagrams were also on view, and a beautiful series of historical pictures in black and white, which would not only serve as illustrations in the history lessons, but as ornaments to the school walls.

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tion were no empty sign, that secondary teachers do not want to exclude primary teachers, and were anxious to strike out the words "other than elementary" from the description of the school in which a teacher must have had experience in order to qualify for registration. He believed that the bridge which was to cross the gap between primary and secondary teachers must be worked at from both sides. Mr. Cartwright said he heard with pleasure this message from the secondary teachers, and expressed his desire for amity, which must, however, be on terms of equality.

The resolution was carried unanimously.

### Staffing of Schools.

Dr. Macnamara then moved, and Mr. Blacker seconded, the following series of resolutions:—

"That, having regard to the fact that elementary schools are no longer to be maintained in any part by the system of voluntary contributions, which was mainly responsible for the scheme for the staffing of schools hitherto fixed by the Education Code, Conference is of opinion that in future the following main principles should guide the Board of Education in making regulations for staffing, and the local education authorities in administering such regulations:—

"(*a*) Except in the small schools, the head teacher should not necessarily be tied to a class. The general supervision of the scholars, the duty of inspecting and co-ordinating the work of the various classes, the responsibility for proper classification and organisation, the admission of pupils, etc., etc., all these make demands of an exacting character; and to tie the head teacher to a class is, educationally, a penny wise and pound foolish policy.

"(*b*) None, except the very smallest schools, should have less than two adult teachers.

"(*c*) It is not educationally expedient to have more than two pupil teachers in a department.

"(*d*) Ample provision should be made for the education of the pupil teacher at some place of higher instruction. The pupil teacher should, moreover, not be engaged in practical teaching work for more than half the working hours named in the Memorandum of Agreement.

"(*e*) Pupil teachers should never be counted at all as effective members of a school staff; they should never be indentured in a school which has not two adult teachers; neither should they be indentured in a school so placed as to make attendance at a place of higher instruction a difficulty.

"(*f*) After an early date no fresh appointments should be made under Article 68, and under no circumstances should there be more than one Article 68 teacher in any department.

"(*g*) In planning a new school no classroom should be built to accommodate more than fifty children, estimated on the eleven feet square basis."

This was moved in a vigorous and incisive speech, illustrated by abundant statistics of the size of classes in Welsh Intermediate Schools (17), English Secondary Schools (22 to 25), France and Sweden (50), Holland, Saxony, and Switzerland (40). So far as administration is concerned, the speaker would place full confidence in Sir W. Anson and Mr. Morant for progressive treatment, and he read the following replies to letters he had written on the subject of the resolutions.

Sir John Gorst, M.P., writes:—

"My dear Macnamara,—I am entirely in favour of raising considerably the scale of staffing in the present Code, as soon as the schools are taken over by the new authority. I think pupil teachers should make their appearance in schools only as learners in the art of teaching, and not as members of the school staff. As regards imperfectly-qualified teachers, they should be got rid of as soon as possible. But Acts of Parliament don't of themselves create teachers, and we have to train a great many more qualified teachers before we can dispense with the services of those imperfect ones now at work in the schools. You will see from this that I concur generally with the resolutions to be proposed at the Annual Conference of the National Union of Teachers."

Sir William Anson, M.P. (Parliamentary Secretary to Board of Education), writes:—

"Dear Dr. Macnamara,—There is much in your proposed resolutions with which I cordially agree, and I fully hope that under the provisions of the Education Act we may soon see a great improvement in the staffing of schools and the education and training of pupil teachers."

Some amendments were moved by Mr. Christian, and seconded by Mr. Arnold, on behalf of the Centre-teachers' Federation. A reference to "the technical training of young children" was inserted among the many duties of the head teacher, enumerated in (*a*); the expression "a department" in (*c*) was converted into "any ordinary department," in order to harmonise with the proposal that certain schools which have exceptional facilities for training pupil teachers may be utilised for the training of a larger number; section (*d*) was amended so as to express a desire that the education of pupil teachers should be carried on "in a pupil-teacher centre of recognised efficiency where such exists, or alternatively at some other place of higher instruction;" and a new clause (*h*) was accepted, that "No teacher shall count on the staff for more than forty children."

The following resolutions were then agreed to unanimously and without much discussion:—

(*a*) Proposed by Mr. A. R. Pickles, B.A., seconded by Mr. Cook:—

"This Conference protests against the regulation of the Board of Education contained in Circular 469, whereby students in Residential Training Colleges, who in 1904 substitute a University Examination for part of their Certificate Examination and fail in it, will only be able to become certificated by passing the Acting Teachers' Certificate Examination.

"This regulation places teachers seeking university degrees at a serious disadvantage compared with other college students, and will consequently greatly discourage those who are seeking university approval of their academic training.

"Conference, therefore, urges the Board of Education to so modify its regulations as to enable collegiate students to seek university distinction without the attendant risk of a heavy penalty."

(*b*) Proposed by Mr. T. H. Jones, seconded by Mr. E. R. Phillips:—

"That this Conference is of opinion that the dismissal as well as the appointment of teachers in all schools should be in the hands of the Local Authority, and that no teacher should suffer disabilities on account of religious beliefs."

(*c*) Proposed by Mr. Dickinson, seconded by Mr. Hirst:—

"That this Conference wishes to direct attention to the hardship inflicted by the non-return of premiums under the Elementary Teachers Superannuation Act, in the event of death before reaching the age of sixty-five; and that the Executive of the N.U.T. be asked to take such steps towards securing the return of premiums in the event of non-survival, as they may deem necessary."

Votes of thanks were then passed to all those teachers and others of Buxton who had laboured to make Conference such a success. The presentation of an address, inscribed on vellum, to Mr. Allen Croft, the ex-President, brought the meeting and the public labour of Conference to a close.

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The sixth session was not open to the press, and Conference again devoted itself to matters of internal policy.

### The Benevolent and Orphan Funds.

On Thursday morning the twenty-sixth meeting of this fund was held in the Pavilion, under the presidency of Mr. South, Chairman of the Central Council. The report of the council showed that the raising of the large sum of £10,000 for a specific object in connection with the fund had been successfully accomplished. For the first time in the history of the fund, the total income had exceeded £20,000. It was therefore proposed to grant twenty additional annuities and twenty new home allowances; while the amount of the home allowances would be increased 50 per cent.—namely, from £13 to £19, 10s., and the special grants to orphans from 2s. 6d. to 3s. 6d. per week.

### Reception of Purses.

On Thursday afternoon, in the handsome and spacious Pavilion which all the week had been the scene of the Conference sessions, public and private, the reception of purses for the Benevolent and Orphan Fund took place. There were no differences of opinion now, no animated debate, no need for the constant clanging of the presidential bell. On all sides crowds of smiling faces, in the front seats the flutter-

ing rows of the purse-holders, on the platform tier behind tier of smart frocks and immaculate frock coats. Now silence, please; the President appears and takes the chair, followed by Mr. Benjamin South, with Lady Newton on his arm. The happiest and most gratifying of all the Conference functions has commenced. First, Mr. Fred Burgiss ascends to the back of the platform and seats himself at the organ to give a masterly recital on the beautiful instrument which the members of Conference have heard with delight on another occasion during the week. Now follows a totally different item, but none the less popular—an address on the work of the funds by the chairman of the Council, Mr. South. After congratulating the subscribers on establishing a record, he passes on to describe in glowing words, and obviously with heartiest sincerity, a little of what has been done during the year to help the afflicted and succour the fatherless and the widow. Proudly he says that if the subscribers have freely given, the Council has freely spent; not a penny has been invested during the year, as it is deemed that our investments already made are sufficient to meet contingencies. Some of the principal items of expenditure are as follows:—On the two orphanages, containing 95 boys and girls, £2,572 has been spent; £1,935 has gone in payment of home allowances to 141 children, orphans of teachers; in annuities to 76 women and 29 men, £3,359 has gone; while giving temporary relief to distressed subscribers has cost the fund £2,780.

After a hearty vote of thanks has been given to Mr. South for his address, a musical item follows, and the audience are left wondering what Mr. Joseph Lycett would be like in his normal condition if he can sing to such effect with a bad cold. The rows of purse-holders now begin to flutter more than ever as they are marshalled for the great ceremony of the afternoon. They file in apparently endless numbers past a gentleman who in stentorian voice announces association, number of members, amount subscribed, and present their purses to Lady Newton, who welcomes each and all with a gracious bow and a kindly smile. Now the cheers rise fast and loud; but notice—it is not the number of subscribers, nor the amount raised, but the *average* per member which wins the applause. Evidently the audience is strong in mental arithmetic, for there is no hesitation in the verdicts, and no mistakes either—the highest averages win the greatest signs of appreciation. Gallant little Buxton, with 40 members and £180, deservedly gets an ovation.

Handsome bouquets are presented to Lady Newton, Mrs. Brown, Mrs. Coward, and Mrs. South, and then Mr. Lycett gives another song, after which the meeting settles down to hear the results of the competitions for the trophy and shield announced. First we are told that the grand total of subscriptions for the year reaches the magnificent sum of £20,263, 10s., an advance of over £5,000 on last year. For the shield given to the association which makes the best average per member, Buxton with £4, 10s. is disqualified under the rule by which the shield cannot be held by the Conference town. The result of this is that Tyneside gets both the shield and trophy, having obtained the highest average, next to Buxton—namely, £3, 18s. 8d. per member, and also the largest aggregate, £1,400.

Votes of thanks are now proposed in suitable words to Lady Newton, to the local committee which has worked so hard to make Conference the success it has undoubtedly been, and lastly to the President for his able conduct in the chair; and after singing "God Save the King," the members disperse with much handshaking, and cries of "See you in Portsmouth."

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The Concomitant Functions included the usual Conference Dinner, a well-attended meeting of the Rurals, the Temperance Breakfast, a Masonic gathering, a Ladies' At Home, and multitudinous College Reunions. Space, unhappily, forbids a detailed account of these highly popular gatherings.

### Centre Teachers in Conference.

The question of the training of teachers occupied a very prominent place in the Buxton Conference, and we cannot pass over the important meeting of instructors of pupil teachers, which was held under the presidency of Mr. A. J. Arnold on the Monday evening. It was announced that several pupil-teacher schools have already been recognised as conferring the right to teachers in them to be registered in column B of the Teachers' Register. Matters affecting the examinations of pupil teachers were discussed, particularly the practice which holds at some colleges of giving the candidates a supplementary examination during King's Scholarship week. No objection was taken to the examination as such, but it was felt that the holding of such an examination in the evening tended to unfit the candidate for the examination during the day by unduly increasing the nervous strain. A difference of opinion arose between the London section and the provincial section over a question of policy; for while all held that the general and professional training of the pupil teacher should proceed *concurrently*, the provincial section contended that this meant simply a half-time arrangement, while the London centre teachers advocate a plan for sending the pupil teacher to centre for two terms in a year, and giving him continuous training in the art of teaching during the other term. Mr. Ernest Gray, M.P., who was present at the meeting, spoke in favour of the London plan.

Mr. Stone, from pressure of other work, was obliged to resign the secretaryship, and Mr. A. L. Cann was unanimously elected.

The president then gave a very able address, dealing with the present position of the pupil-teacher question and the future prospects of the centres.

### THE PUBLISHERS' EXHIBITION.

One practical advantage to be derived from a visit to Conference is so great that it should be sufficient to induce managers of schools to pay the expenses of their teachers who go there—we mean the opportunity of seeing and inspecting all that is newest and best in the way of school books, apparatus, and furniture. The publishers' representatives have perhaps never been so favourably placed as they were at Buxton, where the long, well-lighted approaches to the great central hall of the Pavilion gave them a splendid opportunity of bringing their respective charges under the notice of the teachers.

Immediately inside the entrance on the left was the well-arranged exhibit of Messrs. T. Nelson and Sons; and here a number of illustrations from their various books, printed in colours, mounted together on one card, at once caught the eye, and revealed the perfection to which this firm has brought the art of colour printing. An examination of the books on the show table proved that these were no isolated examples, but that no pains were spared with any of the school books to bring them to the highest pitch in matters of illustration. This was particularly the case with the new *Royal King Primer*, a juvenile book leading up to the *Royal Prince* and *Royal Princess* series. Another excellent series of books shown was the *County Geographies*, readers intended to give children a full knowledge of the county in which they live. Another series that deservedly attracted attention was the modern geographical readers entitled *The World and its People*. The fine relief map of Africa and the wall atlas of Asia were good specimens of the maps produced by Messrs. Nelson.

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books. It is intended for older children in country schools, and deals in a most able manner with the methods of rearing all kinds of farm stock, and is illustrated by pictures of farm animals that have taken prizes in their respective classes. The *Globe Poetry Readers* are a set of books containing well-chosen extracts, attempting to teach poetry in a systematic way. They should do much to develop the literary taste which is rather wanting in our schools. The *New History Readers* of this firm are well arranged, the idea being to teach the subject on the concentric plan; hence the readers consist of four parts—Preliminary (stories and anecdotes), Junior (graphic outlines connected with geography of England), Intermediate (history, with special reference to Europe), and Senior (history, with reference to the colonies). Thus the history of each class is put into relation with the geography. On the opposite side of the corridor was a gentleman who caused considerable diversion by his frequent demonstrations with *Plasticine*, a clean and useful modelling material. Messrs. Chapman and Hall's exhibit of plaster casts and other art material is deserving of special mention. At Messrs. Pitman's stall we spent some time in looking through their *Commercial Reader*, a very useful and entertaining book for the higher standards. The *Britannia History Readers*, published by Mr. Edward Arnold, are such marvels of illustration, containing numerous black and white reproductions of famous historical paintings, that they are deserving of a place on the drawing-room table.

The exhibition of furniture and fittings was held in the town hall, and we stood for a long time admiring a beautiful model of a movable partition made by John Heywood of Manchester. It would be impossible to find more suitable means of making the same building serve either as a large hall or as a series of class rooms. Opposite this were the pianos of Cresswell, Ball, and Co., on one of which was exhibited a letter from Mr. J. H. Gregory, Conference secretary, stating that he has had one of these pianos in school for three years, and knows of no better instrument for school use. In addition to a strong, satisfactory class of piano for school use, this firm supplies a special one for the teacher's home of a very high order of excellence and at a low price. The Educational Supply Association had a good assortment of school furniture, among which we specially noted a desk made of light wood for use in girls' schools, and their "Perfect Desk," in which the hinges are placed right at the top of the writing slope. Mr. S. Bridge, of the Lye, Stourbridge, who has exhibited specialities in school furniture at the last eleven Conference exhibitions, showed his "New Crown" Desks for elementary, secondary, and technical schools. The desk for boys and girls is fitted with an ingenious arrangement for fixing the desk-top in four different positions, for writing, needlework, freearm drawing, and as a back-rest for the seat. A new and special feature of this desk is that the joint between the front and back portions of the desk-top is thrown wide open during the alterations of position, so that there is no danger to the children's fingers.

## N.U.T. NOTES.

BY A. C.

***The President.*** The Buxton Conference has come and gone, and its success has been of the most pronounced and gratifying character. Visitors began to arrive as early as the eve of Good Friday, and when the Conference was formally inaugurated on Easter Monday the attendance was large and enthusiastic. This year's President, Mr. Harry Coward, more than realised the high anticipations of his scores of friends and admirers, and worthily maintained the traditions of his exalted position. His presidential address was a clear, statesman-like, and altogether *apropos* pronouncement on the educational position to-day; and his reference to the London Bill, introduced by the Government on the Tuesday anterior to Easter Week, was timely, and evidently to the taste of his auditors. It was of model length, and admirably read, and Mr. Coward received an ovation on resuming his seat. Throughout the week he ruled in the chair *more suo*; but Conference loves a chairman who knows his own mind, and gets along with the business in hand. Good-tempered, yet firm withal, Mr. Coward can look back on the Buxton Conference week as one of unalloyed triumph, and the final vote of thanks, in the hands of his friends and comrades, Messrs. Blacker and Francombe, was agreed to with a great shout, calculated to thrill the emotions of a man of much less fine susceptibilities than Bristol's President.

***Election Results.*** The results of the elections for both Vice-Presidency and Executive are always anticipated with almost feverish interest and excitement. With one or two notable exceptions, to which I allude in the next paragraph, these elections went according to popular prediction, and I append a table for those who love statistics:—

N.U.T. Elections (Executive).

| Year. | Number of Candidates. | Average Number per District. | Districts with no Contests. | Old Members Unseated. |
|---|---|---|---|---|
| 1898 | 86 | 7·2 | ... | 3 |
| 1899 | 58 | 4·8 | 2 | 4 |
| 1900 | 60 | 5·0 | 1 | 4 |
| 1901 | 52 | 4·3 | 2 | 2 |
| 1902 | 56 | 4·7 | 2 | 2 |
| 1903 | 59 | 4·9 | ... | 3 |

V.-P. Election.

| Year. | N.U.T. Membership. | Voting Papers Returned. | Number of Candidates. | Winner. | Winner's Poll. | Winner's Percentage of Votes. |
|---|---|---|---|---|---|---|
| 1898 | 38,687 | 29,179 | 3 | Clancy | 15,506 | 53·1 |
| 1899 | 40,485 | 28,884 | 5 | Jackman | 7,679 | 26·6 |
| 1900 | 42,005 | 28,665 | 4 | Blacker | 13,711 | 47·8 |
| 1901 | 43,614 | 30,186 | 3 | Croft | 15,428 | 51·1 |
| 1902 | 45,153 | 31,494 | 4 | Coward | 16,109 | 51·1 |
| 1903 | 47,326 | 34,220 | 2 | Sharples | 19,302 | 56·4 |

The success of Mr. George Sharples was received with unbounded enthusiasm, and his record poll is sufficient testimony of his personal popularity. His thanks to Conference, wherein he referred to the merits of his defeated friend and opponent, were in excellent taste, and most cordially received. Mr. T. H. Jones, with a total vote of 13,436 appended to his name, is assuredly our next Vice-President, and well he deserves the distinction. His devotion to the tenure work of the Union, his modesty and singular unobtrusiveness, have all had their share in endearing Mr. Jones to the hearts of good Unionists. It would be a graceful and politic action were all aspirants to the Union's blue riband to allow him the privilege of a "walk over" for 1904.

***Mr. Wild's Defeat.*** With the exception of Messrs. Hindmarsh, Phillips, and Wild, all the former members were returned to the Executive. The first-named gentleman has for the second time lost his seat by an infinitesimal number of votes, being but eleven in the rear of the third successful candidate. The defeat of Mr. E. R. Phillips in South London is, to me, quite inexplicable. For five years he has been one of the hardest workers and soundest debaters on the Executive, and never once within my recollection has he wasted a moment of time. His speeches have been ever short, pithy, and to the point; and his ripe knowledge of public affairs will be much missed. Last year, Mr. Waddington's non-success at the Executive election provided a "sensation" which it was thought could not readily be repeated. Yet the Tuesday in Easter week witnessed the rejection of the veteran Robert Wild by the East London electors, to the amazement and grief of nearly every member of Conference. No words of mine are needed to depict the virtues of the cultured gentleman to whom the unique epithet "Twice President of the Union" can be applied. In his day and generation he rendered as great a service to national education as Dr. Macnamara and

his compeers are now doing, and his difficulties and responsibilities were infinitely greater. His paper on "Examination of Scholars," prepared at the request of the Executive, and read after the President's address on Easter Monday, showed him still *au courant* with the most urgent and pressing of vital educational reforms. His old-fashioned courtesy and fatherly dignity furnished us younger men with something to emulate, whilst his well-stored mind made him ever the most delightful of friends and companions. The Union, despite its strength, can ill afford to spare men like Robert Wild!

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***The New Members.*** There are six new members of the Executive this year: Messrs. A. W. Dakers, Sparrow, Flavell, Crook, Burkett, and Folland, and from each gentleman much is expected. Mr. Flavell was, in former days, what was known as a "district union" representative, and in that capacity rendered excellent service to the Midland District Union. I am personally delighted at his reappearance round the Executive Board. Messrs. Dakers and Folland bring the class-teachers' representation up to eight, which is modest enough in all conscience.

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***Business Done.*** Year by year, the agenda arranged for the public sessions with almost loving care is cast to the winds. 'Tis true that at Buxton all the motions set down for both Tuesday and Wednesday mornings were agreed to, but the major amount of time was devoted to subjects not on the original agenda paper at all. The London Bill, the staffing of schools, university examinations for certificate students, were some of the interpolated questions; whilst the presentation to Sir George Kekewich, K.C.B., occupied more time than had been contemplated. "Without notice, without any summons, without any apparent particular reason, the vast audience at this stage rose as one individual: it was to give Sir George Kekewich, who had just entered the hall, a reception such as few have ever had the honour to receive. Three deafening cheers were followed by others," etc. Thus the able special representative of the *Buxton Advertiser* describes the striking scene. The President, Vice-President, General Secretary, Mr. Wild, and Mr. Blacker voiced the teachers' gratitude in eloquent terms, after which a magnificently-illuminated address, in album form, enclosed in a handsome casket, was handed to Sir George. His reply occupied some fifty-five minutes in delivery, and was listened to with almost breathless interest. I am diffident about venturing on any criticism of Sir George's speech, yet I feel compelled to say that, in my own judgment, the altogether unexceptionable first part was a little marred by the subsequent comments, evidently intended for the Exeter electors. The dangerous innovation of suspending the constitution in order to create Sir George an "Honorary Member of the N.U.T."—whatever this may mean—is one which I sincerely deprecate. My own view (which may easily be wrong) is that even Conference itself is limited in its powers by the *ipsissima verba* of the rules of the Union.

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***The London Bill.*** Recollecting the keen and critical debate on the 1902 Education Bill, one looked forward confidently to an interesting discussion on the London Bill. But 'twas tame in the extreme. Mr. Marshall Jackman, in a closely-reasoned and convincing speech, so riddled the measure that it hardly required Dr. Macnamara's fiery eloquence to secure the passing of the Executive's condemnatory resolution, with but one dissentient. Messrs. Tinner and Despicht, by their speeches against the motion, showed that they knew their battle was a losing one, and it is almost a pity they exposed the weakness of their own case.

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***Private Sessions.*** The "private sessions," open only to members of the N.U.T., were this year a welcome contrast to the many that have preceded them. "Business only" seemed to actuate the representatives; and I rubbed my eyes with astonishment when I found that the financial statements were passed in less than one hour, and that not a single word of aspersion or innuendo was heard against the personal honour of the members of the Executive. Long may this spirit remain! A long and (at times) exciting debate on the "Organ of the Union" was inaugurated by Mr. T. Cartwright of Finsbury, and possibly this was "the speech of the week." Only a combination of the most perfect cinematograph and phonograph could do adequate justice to this fine effort of Mr. Cartwright, who was cheered to the echo on resuming his seat. Subsequent speakers paled by comparison, and the *Schoolmaster* directors who tried to save the situation cut but a sorry figure. Replying on the debate, Mr. Cartwright, if possible, excelled himself. Quip and crank and tit-bits of smart repartee abounded in a brief speech, which was masterly, clever, and humorous. The country will await with interest the result of the year's "negotiations" between the Union's representatives and the *Schoolmaster* directors.

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***Election of Executive.*** Conference has evidently made up its mind that the Executive is now "too big," for on Wednesday, 15th April, it instructed the Executive to prepare a scheme which shall provide for thirty-six members only. This reduces the number by ten or eleven, and is well worthy of consideration.

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***The Dinner.*** The Conference dinner is, I believe, designed mainly for the purpose of offering some slight hospitality to the many local celebrities, both inside and outside the teaching profession, who have during the preceding twelve months striven so strenuously to make Conference a success. Sometimes the function is dull and heavy, and funereal almost; but the Buxton dinner was one of the brightest and best of the long series I have been able to attend. The music was of high quality, whilst the post-prandial oratory was of a singularly felicitous nature.

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***Next Year.*** Llandudno and Portsmouth strove for the honour of entertaining Conference in 1904, and the result of the poll was:—

| | |
|---|---|
| Portsmouth | 21,723 |
| Llandudno | 12,548 |

So to Portsmouth we shall hie, assured of a hearty reception and adequate and complete arrangements. Mr. Tegarty, the hon. secretary of the Llandudno Association, is a gentleman whose zeal and energy have no limits, and he must have been gratified at seeing so large a poll to the credit of the Queen of North Wales. When it began to snow on Easter Sunday at Buxton, and continued to do so intermittently on the next two days, delegates began to sigh for the "sunny south," and thus came Portsmouth's chance.

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***Reflections.*** "Highly successful" must be the verdict of the two thousand members of the Buxton Conference, and the plucky little association of forty members has worthily carried out its pledges of a year ago. Possibly by the very nature of things the Conference had something of a "holiday character" in its composition, and certainly the speeches were not of the high order of twelve months before. Yet Buxton, 1903, was a fitting successor to Bristol, 1902, and I can give no loftier praise.

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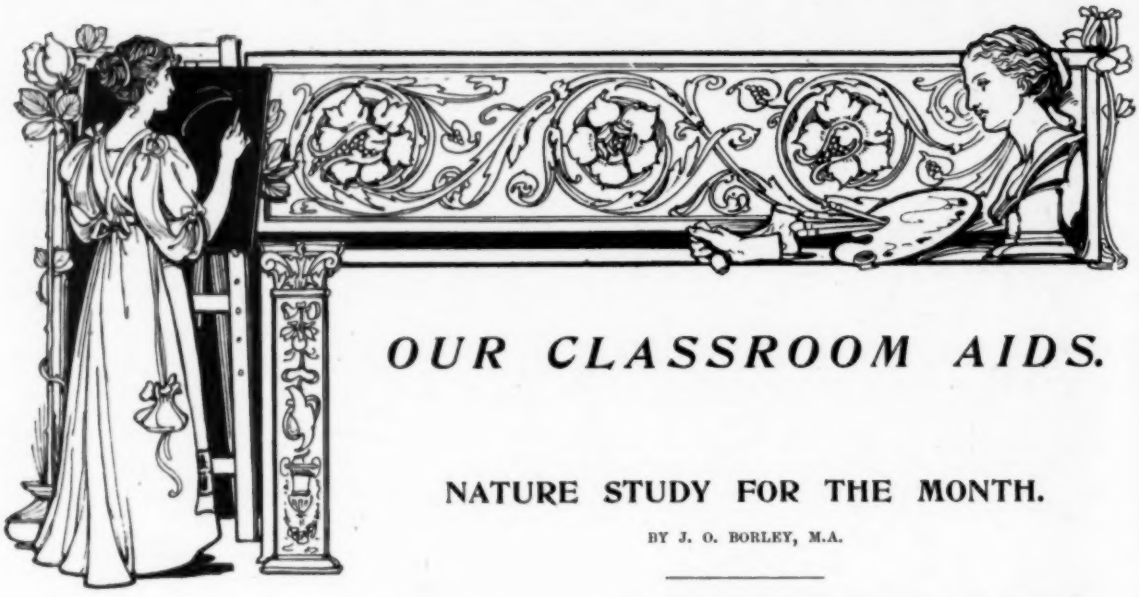
MAP OF THE STARS.—In consequence of various inquiries after maps of the heavens, we are pleased to inform our readers that the star map presented as a supplement to the *Practical Teacher* ome time ago has been reprinted, and can now be obtained on specially stout paper, with metal mounts, for the small sum of eighteenpence. It will be found a most useful chart to hang in the classroom, as, in addition to a clearly printed map of the heavens, it gives pictures of the planets to scale, and reproductions of photographic views of a lunar crater and a sunspot.



# OUR CLASSROOM AIDS.

## NATURE STUDY FOR THE MONTH.

BY J. O. BORLEY, M.A.

### Limnæa, a Pond Snail.

IN most ponds and other pieces of still water pond snails can be found in considerable numbers. There are several kinds or genera in most European ponds; but as Limnæa is the commonest and best known, it has been chosen for description. Much of what follows applies, however, to other and larger snails.

The body of the animal is soft and muscular, and therefore capable of assuming an almost infinite number of attitudes; and this, added to the curious latitude allowed the creature in the angle at which it carries its shell, makes it difficult to select one view of the snail and say, "This is a Limnæa." While one is yet sketching the head with its lobes and tentacles fully extended, it may slowly contract to a bluntly-pointed mass; or the shell may be abruptly drawn from a rakish tilt into a decorous, upright position that gives quite a different aspect to its curves. This plasticity, with its vague but real retention of the constancy of structure, is well worth watching for a time. To realise it is to realise the essential character of the class (Mollusca) to which Limnæa belongs. Fig. 1 has been chosen as the view best suited to aid identification.

FIG. 1.—LIMNÆA, A POND SNAIL.

The snail thus seen from above, as it crawls over the bottom of an aquarium, shows the paired eyes, two flattened tentacles, and two lobes, flattened (but thicker than the tentacles), below which, and surrounded by which, is the mouth. These lobes are peculiar to Limnæa; their form and position under the eyes, and a slight ridge which occurs between them, give the head something of the appearance of a grotesque face. All snails possess them before leaving the egg, but all except Limnæa lose them before maturity.

Of the eyes little need be said. They possess a lens, behind which are a retina and optic nerve, the former containing pigmented rodlike structures, somewhat like those of our own. What impressions they convey to their owner it is impossible to say. It is certain they are far less distinct than our own visual impressions, since that is inevitable from the simpler structure of the eye. Light and darkness, at any rate, produce their effect; for in a partly darkened aquarium certain species congregate in the light, others in the darkness. The tentacles are probably more important, and seem to be the seat of smell. They are kept in gentle motion, somewhat a symptom of a sense organ, as in the case of an insect's or a crayfish's antennæ.

To those acquainted with land snails only, the pond snail's shell will appear far less closely applied to the body than was expected: it seems to be borne on a short thick stalk, having much the same relation to the foot and head that the first few inches of the handle of a hammer have to the claw and clubbed, flattened head of the hammer itself. Probably the supporting pressure of the water has some share in bringing this about, as well as the fact that keeping the broad rigid shell at some distance from the bottom surface of the foot enables the latter to move in and out of narrower crevices than it could otherwise do. It must be remembered that the shell is made more buoyant by containing air. Under the lip of the shell is a chamber whose floor is the snail's body, and whose roof is a thin outgrowing fold of the body wall called the mantle. On this mantle's inner surface a network of blood-vessels enables the blood to be aerated; for the cavity, being filled with air, acts as a lung.

Frequently the snail puts itself in a position to demonstrate this presence of air by crawling upside down beneath the surface film of water. If a morsel of salt be dropped on the centre of the foot, the latter is drawn back into the shell so suddenly that air is expelled, and the animal sinks, with bubbles rising from below its shell as it goes down. As the snail immediately crawls up to replenish its air supply, this is exhausting, and should not be repeated: it is well to note that salt and water is *not* a good thing to use to kill snails of any sort. Dropped into boiling water, they are killed immediately; and if required for dissection can, on removing them from the water at once, be easily taken out of their shells.

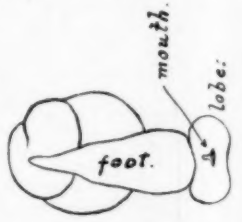



FIG. 2.—LIMNÆA, UNDER SURFACE.

Fig. 2 is a diagram of the under surface of a young Limnæa, drawn as it crawled on the glass side of its tank, browsing on the green vegetable film that was beginning to form there.

This convenient habit gives us an unusually good opportunity of watching the snail's mouth at work. When shut, the mouth makes a minute T-shaped slit in the middle of the oral lobes. It is hardly ever at rest, but constantly giving way, and breaking up into a large oval opening, and again closing, with so even a movement that its stages are not at first plain. After a time, however, the T is noticed to have a double outline. The two sides of the down stroke are then seen to separate at the bottom, and, keeping at the same angle to the lower of the lines forming the cross-piece, open out with them as if the latter were hinged at their

extremities. In Fig. 3 the reason of this is given. The snail has three jaws, of a horny consistency. The first is at the front of the mouth, somewhat crescent-shaped. To its extremities are hinged a pair of side jaws, each with a right-angled bend. When open, these take the position shown by the dark lines: when shut, they move inwards to the position shown by dotted lines, sweeping small objects with them. Why is there no jaw at the back? When the side jaws are closing, a reddish tubelike opening moves rapidly forward between them, towards and against the front jaw, and the floor of this opening, corresponding in position to our tongue, is thickly studded with minute teeth. The enclosure is thus completely bounded by hard substances, while the preliminary sweep inward of the side jaws gives the mouth a formidable area of play.

FIG. 3.—JAWS OF LIMNÆA.

Although Limnæa is by habit a vegetarian, it is not always so. Instances have been known of an old newspaper thrown into a pond being thickly covered with feeding Limnæa, and of their feeding on old fish-heads. What is much more strange, they have been known to overpower and devour newts and even sticklebacks. How such slowly moving creatures can prey on quicker ones in this way is wonderful, but it is not an uncommon thing. Recently a pretty Eledone, a reddish-pink cuttle-fish, was put into a tank at Plymouth with some king crabs that seemed able only to lumber slowly along the bottom; yet a few mornings after, the active Eledone had vanished, finally and utterly.

Without attempting much dissection, it will be well to examine the mantle cavity and the body within the shell. Having killed a snail and removed its shell in the manner described, the shell will be seen to have been filled with the animal's body, except where, in front and at the base of the body, the skin seems loose. Cut this along its left side and along the bottom margin with a sharp penknife. It is best done in a shallow dish of water. On turning back the flap so made the breathing chamber is open, and there should be visible in the roof of the chamber—that is, in the flap—many ramifying tubes, the blood-vessels, spread out to ensure aeration of the blood. Pin the snail down by the foot to a broad cork wedged firmly at the bottom of some shallow vessel, such as the small china trays potted meats are sold in; or better, let the cork be weighted by being nailed to a piece of sheet lead. Cover it with water, and with a sharp penknife cut into the cavity below the loose skin down the snail's left side and along the front margin. Turn back and pin down the flap so liberated.

On the wall of the flap the blood-vessels can be seen, leading by continual junctions to the small thick-walled heart, much as the twigs of a tree, followed inwards, lead to branches and trunk. The heart lies covered with a thin membrane, which can be stripped off with a needle. It has two chambers, one receiving and one sending on the blood. Next to it is the excretory organ or kidney. An opening for the ingress and egress of air can be found on the right front edge of the cavity. Close to it is the opening of the rectum.

Turning the snail over, a piece of fine bent wire with rounded end may be pushed into the mouth. It will be found to grate on the teeth spoken of above. These teeth are extremely minute, but number eight thousand odd. They are set in rows in their bed, the whole being detachable together as a ribbon. Any one who possesses a microscope will find it can be examined easily by putting it on a glass slide in a drop of glycerine. It is very beautiful in its regularity of pattern.

A microscope can also be used with great interest upon a piece of the spawn, such as was figured in last month's issue. The minute transparent globules, which are the eggs, will be seen to have formed each a minute brown spot; and the development of these can be watched until, just before hatching, tiny snails are seen crawling within the eggs, each snail with its minute shell, minute foot, little black eyes, tentacles, and oral lobes, but almost transparent; and owing to this transparency the pulsations of the heart can be distinctly seen, as also the motion of the pharynx, moving forward to the very front of the head. The mass should be well covered with water.

It so happens that the most favourable temperature for the snails is about that of an ordinary living room—namely, 68° F. They can live, however, at very different temperatures. They have been known to revive after living in water which has become frozen; and one form of Limnæa inhabits hot springs and the basins of geysers. This is only to be expected of a genus whose distribution ranges over all Europe, Asia, and North America; but with a characteristic immobility of nature, the forms living in hot or cold surroundings are still stunted, and develop but fragile shells, as is the case in a badly heated aquarium. The aquarium should not fall much below 60° F. or rise over 80° F.

The shell appears, indeed, especially susceptible of outside influence. The fourth generation of tank-bred snails have been mistaken by experts for another species. Semper found that the mere volume of water in which they lived had a direct effect on the size of the shell, apart altogether from food, etc. Fig. 4 shows the relative sizes of shells grown in (A) 100, (B) 250, (C) 600, and (D) 2,000 c.c. of water.

Some surprise has been occasioned by the wide distribution of such a slowly moving form. This distribution may be due to the weakness of hold of the young upon the objects on which they crawl. Any time of flood which invades the ponds must wash away thousands—most, no doubt, to destruction, but here and there one to favourable conditions of stagnancy and the founding of new colonies. The sticky but fairly tough spawn masses may often also be carried on the feathers of water-birds for some considerable distance.

FIG. 4.—THE INFLUENCE OF VOLUME OF WATER ON SIZE OF POND SNAIL.
A, Reared in 100 c.c. of water.
B, Reared in 250 c.c. of water.
C, Reared in 600 c.c. of water.
D, Reared in 2,000 c.c. of water.
(*From Semper.*)

## Frogs and Newts.

Those who care to rear tadpoles to the adult stage may find the following points worth noting. It is less easy to obtain the spawn or tadpoles of newts, partly because in all but one of the three English kinds of newt (in which one case the eggs are laid in a row) they are laid singly. The tadpoles of newts differ from those of frogs in having longer gills, a longer tail which does not tend to become absorbed but is retained, and fore legs which appear before the hind ones. Tadpoles which are approaching the adult condition and adult creatures need to be furnished with means of leaving the water; and as long as water is provided, and sufficient rough brick or rock work to form cool dark shelters, they can be kept in an ordinary garden, when they will feed on worms and insects.

*Structure.*—The class to which both belong is exemplified in its two chief branches by the frog and the newt. In one the tail is retained, in the other the tail is absorbed. This probably has some connection with the different development of the hind limbs. The newt, swimming by means of its tail, is merely anxious to make its limbs as little obtrusive as possible. They are carried with the digits trailing back while in the water. The frog, having no tail, develops webbed back feet and most powerful back legs, and swims much as a man does. Bound up with the absence of the tail and development of hind limbs is the frog's power of jumping. The more complete the absorption of the tail became, the better the conditions for jumping grew; and the frog's back legs have in the end assumed a totally different posture from those of the newt. A diagram in which trunk, limbs, and digits are represented by straight, thick lines should be made, from above, of a sitting frog and resting newt. This will bring out the change and its fitness with great emphasis.

Points possessed by both are:—

1. Five digits on foot of hind limb, four on hand of fore limb.
2. Smooth skin.
3. Prominent eyes, that can be retracted considerably into the head.

4. Small teeth in the roof of the mouth, which is wide.

5. Eyelids closing from top and bottom, but the lower eyelid moving to greater extent than the upper.

6. Method of breathing. Neither possesses ribs or diaphragm, whence air has to be forced into the lungs from above. This is done by filling the mouth with air, closing the nasal passages by pressing the tongue against the roof of the mouth, and then contracting the muscular cheeks and mouth floor. This motion of the floor and the opening and closing of the nostrils can be easily seen.

The tongue is similar in each, but in the frog is made protrusile by being rooted at the front only. It can be darted out with great speed, and is sufficiently sticky to capture flies, etc. The newt's tongue is rooted to the floor of the mouth. The action of the eyelids is plain if the finger is gently approached to the creature's eye.

English newts are of three kinds, all of which are crested and brightly coloured during the breeding season. A rare form, found in the west and north of England, has, in the case of the male, not only the customary crenellated, finlike crest from neck to tail, but a similar membrane below the tail, and webbed hind feet. The commonest form is in colour—yellow below, darkening to brown above dappled with darker spots. The male has a crest. The largest form is the crested newt. This has a rough skin, is dark in colour, with orange under-surface, and reaches the length of about half a foot.

*Life history.*—The eggs of newts are laid in early summer, from April to June. In about a month the eggs hatch; in another month the limbs appear; by the end of autumn the newt leaves the water, and lives creeping in damp, sheltered places beneath stones or in crevices of rocks, feeding on insects and worms. In four years he is full grown, and seeks the ponds in the spring. Except in the first half of summer, therefore, the newt race has abandoned the water. It is evidently only the necessity of water for the young that takes it back. The logically consistent future for newts would appear to be to obviate this necessity, and become land animals entirely.

Possibly the European salamander, which only visits the water to deposit its young, which have already left the egg, has taken a step in that direction. A further hastening of development would evidently lead to the complete elimination of the tadpole stage, and hence of the need for water.

### The Cuckoo.

This month the cuckoo arrives, and is heard far more frequently than seen. He is a rather large brown bird, resembling a hawk in appearance and flight, a fact which has its use, perhaps, in frightening away a small bird from its nest when the cuckoo is bent on one of its usual acts of fraud.

No general account need be given of the distinctive habit of foisting its eggs on other birds, but some few details may be welcome.

It should be remembered that the habit is sometimes shared by other birds, such as the starling. The cuckoo shows us, therefore, a highly developed case of fraud, for which the raw material is found scattered throughout the whole class of birds. Why this intensification has occurred is unknown. From the time of laying till the time the young cuckoo leaves the nest is about two and a half months; and some consider this the cause, since in many cases the cuckoo's migration would leave the young helpless. Again, the American cuckoo, which does build a nest, hatches young one at a time, since it sits as soon as the first egg is laid; and this may be a thing to be avoided. It would seem, however, simpler for a change to occur in the time of sitting than in the whole nest building. Nor do we know which habit is ancestral—the American or the European, which is also the Australian.

The egg is laid on the ground, and then transferred in the bill to the nest of a hedge-sparrow, water-wagtail, or other small bird. This has been observed by telescope. The egg, it may be noted, is as small as a hedge-sparrow's, though the bird is five times as large as the sparrow.

Other adaptations to its way of life chiefly occur in the young bird, of whose operations in the nest the great Jenner of vaccination fame has given the best account. One consists in a hollow or depression between the shoulders of the young bird, which lasts for twelve days. Three or four hours after hatching, the young cuckoo works its body backwards beneath the egg or fledgling to be ejected, after first investigating it (the cuckoo being still blind) with its very sensitive wing tips. Raising its fore limbs, and so increasing the carrying space of its back, it then backs up the side of the nest, and tilts its burden out to die. The parent cuckoo has not been proved to eject any young birds.

The foster mother feeds the young cuckoo with the food its own young would need during a period of eight weeks, and long after the fed has outstripped the feeder in size. The cuckoo has, therefore, powers of digesting any form almost of animal and even vegetable food. It is not generally known that thrushes and other small birds confined in a cage with a young cuckoo start feeding it voluntarily, as far as can be seen, but afterwards they continue under pain of formidable attacks.

The cuckoo leaves us in July.

## NATURE KNOWLEDGE.

BY JAMES KNIGHT, M.A., B.SC., F.C.S., F.G.S., F.E.I.S.,
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LAST autumn the School Board of Glasgow held an informal conference on the subject of nature knowledge with a view to introducing into all the schools of that city a fairly uniform scheme, and especially, from the School Board standpoint, of determining what apparatus should be supplied in connection with such a scheme. Acting upon lines suggested by the chief Inspector, who took part in the conference, a committee of head-masters has prepared the following scheme, which is intended as a common basis of instruction in their schools, leaving it open for individual schools to expand portions in harmony with their own individual resources. Although the scheme has not yet received its official approval from the Department, or been formally adopted by the head-masters of the city as a whole, it is given here in the hope that it may be useful to individual cases, and in anywise fertile in suggestions for a city teacher whose opportunities of direct nature study are somewhat limited.

For the sake of convenience, the former term "standard" has been retained, and it is generally understood that the lessons are given twice a week, lasting from thirty to forty minutes each. The figures in brackets denote the number of lessons.

### Infant Division.

I. *Animal Life* (7).—Cat; dog; horse; cow; hen; sparrow, or other familiar bird; a fish.

II. *Plant Life* (7).—Any large growing plant to show roots, stem, leaves, buds, flowers, fruit. Grow bulb in water, peas and potatoes in earth or damp sawdust, mustard seed on damp flannel.

III. *Form* (7) *and Colour* (5).—Lines—straight and bending, upright, slant, horizontal; square; oblong; circle; ball.

Black and white; red; green; yellow; blue; purple; orange. Shades of colour.

[The colour lessons, it will be observed, are given in their physiological or perceptive order.]

IV. *Common Things* (6).—Things that float or sink; things that melt (ice, butter, wax, pitch); things that dissolve (sugar, salt, magenta for colour); water and steam; a candle; money treated as different sorts of metal.

V. *Natural Phenomena* (10).—A sunny day; shadows; a rainy day; snow; the clock face; days of the week; the seasons, with typical illustrations.

### Junior Division.

STANDARD I.

I. *Animal Life* (12).—Repeat infant lessons on animals, and add sheep, rabbit, weasel, owl or hawk, any aquatic bird (gull or duck suggested).

II. *Plant Life.*—A flowering plant as a whole for revision; apple; orange; plum; potato; turnip and carrot; onion. Common flowers, with specimens. Germinate potato.

III. *Natural Phenomena.*—Repeat weather phenomena; cardinal points; compass card and needle.

STANDARD II.

I. *Animal Life* (10).—Cow (milk, butter, cheese, horns and hoofs, flesh, hide); horse compared with cow; rabbit and hare; mouse and rat; sheep and goat; dog and cat; spider and fly.

II. *Plant Life* (5).—General build of a tree (timber, bark, foliage); common leaves, with specimens and drawings; nut; acorn. Germinate beans, peas, and any bulb. Common flowers, with specimens.

III. *Natural Phenomena* (5).—Rain; snow; ice; the mariner's compass; directions within the school.

STANDARD III.

I. *Animals treated as Types.*—Dog—breeds and uses; the dog family (fox, wolf); cat family (lion, tiger); frog, toad, and newt; butterfly, for metamorphosis; bee and its products.

II. *Plant Life.*—Tree—general build; recognition of six common trees; oak; beech; fir cone; parts of a flower, illustrated by common flowers; oats, wheat, and barley; flour, oatmeal, bread.

III. *Natural Phenomena.*—Sun and its apparent motions; shadows; varying length of day; the seasons; fog and mist; dew; hail.

**Senior Division.**

STANDARD IV.

I. *Animal Life* (10).—Herring compared with flounder; common sea-shore animals; worm, snail, or slug; bat; mole; squirrel; swallow, for migration.

Lessons on animals do not go beyond this stage, and any further study of animal life takes the more personal form of ambulance work, with its usual basis of physiology and hygiene.

II. *Plant Life* (6).—Roots, in the popular sense—grasses, strawberry, lesser celandine, creeping crowfoot, coltsfoot, for examples; stems—trailing, twining, creeping; leaves and their uses.

III. *Natural Phenomena and Experimental Science* (8).—Solution, suspension, filters; weighing and measuring; general experiments in sound; magnets and compass.

The Clyde basin for general physical geography.

STANDARD V.

I. *Plant Life* (7).—Plant physiology; functions of roots, stem, leaves; dissection of wallflower, primrose, wild rose, pea blossom, a lily (four at least of these).

II. *Natural Phenomena* (12).—Night and day; clouds and their characters; dew; hoar-frost; fog. Heat—its effects on solids, liquids, gases; conduction, convection, radiation; thermometer, with practice in reading and marking on squared paper to get the temperature curve. Light, general lessons; reflection; refraction; prism; rainbow; Newton's disc.

III. *Ambulance* (6).—Build of the body; muscles—sprains, strains, bruises; the circulation and bleeding; breathing and suffocation; surface injuries—burns, scalds, cuts, etc.; poisons and antidotes, common household emetics.

IV. *Local.*—Five optional lessons on local industries.

STANDARD VI.

I. *Plant Life* (8).—Fruit trees with flowers and fruit; flowers; fruit; seed. Forest trees; ferns; poisonous plants.

II. *Natural Phenomena* (12).—Striking celestial phenomena; phases of moon; prominent stars; eclipses. Air and its composition; barometer, with reading and curves; wind; ventilation. Electricity, simple experiments in frictional and voltaic electricity; decomposition of water; the telegraph.

III. *Local.*—Lessons on the city of Glasgow—its history, enterprises, government, divisions, and organisation.

**Apparatus.**

The apparatus chosen to illustrate these lessons is almost entirely of a general nature, capable of being used in several connections. It is understood that animal lessons are given preferably from the living animal wherever possible; failing that, from stuffed specimens. Diagrams are used only to supplement the main illustration, to carry out the type teaching demanded in Standard III., or to recall such well-known animals as the horse and cow, which can hardly be introduced *in propria persona*. The plants discussed are in every case actual specimens, trees being represented by their leaves, wood, bark, with a picture of the complete tree.

Glass basin, 12″ × 5″; three spirit-lamps for rooms where Bunsen gas-burners are not available; three tripod stands; a square yard of wire gauze; three small enamelled iron basins, say 4″ diameter; three dozen test-tubes, 8″ × 1½″, and stand for six of these; one dozen twenty-ounce Florence flasks; three india-rubber stoppers, with two holes, to fit the flasks; a yard of connecting india-rubber tubing, ¼″ to ⅜″; specimen candles, dip, wax, paraffin; small tin candle-stick; stoppered bell-jar, 10″ × 5″; air-pump or aspirator, the latter when there is a water-tap in the class-room.

Clock face for infant classes; compass card and needle; specimens of hide, hair, horn; diagrams of animals named; specimens of timber with bark; leaf specimens; nuts, acorns, etc.

In Standard III.—Diagrams of fox, wolf, lion, tiger, frog, and newt to supplement living animals; diagrams and specimens of butterfly and bee, wax, honeycomb. Specimens of oats, wheat, barley; specimens to show the stages of flour, meal, etc.

Wet and dry bulb thermometer; maximum and minimum thermometer; a simple tellurium or any other apparatus to show the relations of sun, earth, and moon.

In Standard IV.—Horseshoe and two bar magnets with keepers; pitchfork; cheap violin set; cheap form of siren; an organ-pipe; electro-magnet; dipping-needle; one pound of iron filings; six beakers, 6″ × 3″ and 4″; six filter funnels; filter papers; ½ cwt. of clay; ½ cwt. building-sand; one pound bone charcoal; a measurer's stick; a surveyor's chain. Stuffed bat, squirrel, swallow; diagrams of others.

In Standard V.—Packets of cardboard for mounting leaves and other plant specimens; two flat mirrors (6″ to 8″); a prism; Newton's disc; ¼ stone lead, and ladle for melting it; ring and ball for expansion; common paraffin lamp with reflector; outside and inside callipers; squared paper ($\frac{1}{10}$ inch) for barometric and other records. Marshall's diagrams of the body, Nos. 1, 3, 4, 5, 6.

In Standard VI.—Bacon's diagrams (2) of poisonous plants. Box of tapers; 1 oz. litmus; 1 oz. yellow phosphorus; a small Wimshurst machine; rods of glass, sealing-wax, vulcanite; catskin, silk, and flannel rubbers; box of pith balls; five-cell bichrome battery; eudiometer; small induction coil; model telegraph set.

Nelson's diagrams of plant life are recommended as being the best for general use all through the standards.

The above list of apparatus sounds formidable, but it is not so bad in practice. The heavy items—stuffed animals and physical apparatus—are all capital expenditure which does not require to be repeated; while a very small sum, under half a sovereign, will amply meet the annual charge for renewals and waste, if proper care is taken with such brittle articles as beakers, flasks, and test-tubes. The great majority of the botanical and industrial specimens will be supplied by the scholars themselves; three or four well-selected Saturday rambles will soon fill a very fair museum case; and local manufacturers and shopkeepers will, as a rule, be delighted to secure the cheap advertisement afforded by the gift of educational sets.

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WE have been asked whether it is intended to continue the issue of "Celebrated Pictures" in *The Practical Teacher*. The course of notes of lessons in connection with which the pictures were issued is now concluded; but we may inform our readers that the pictures were reprinted from *The Practical Teacher's Art Monthly*, in which a long series, with descriptive accounts, has appeared.

# HISTORY DAY BY DAY.

## May.

**1st.** *Legislative Union with Scotland, 1707.*—The legislative union of England and Scotland dates from 1st May, although the first parliament did not meet till several months later.

*Opening of the Great Exhibition, 1851.*—This first organised gathering of representatives of the world's industry was proposed by Prince Albert, and it was largely by his influence and energy that the idea was carried out. The exhibition was held in Hyde Park. The huge palace of iron and glass, designed by Paxton, was afterwards removed to Sydenham, and still forms a popular resort.

**2nd.** *Chartist Riot at Birmingham, 1842.*—Chartism, the last effort of which we saw on 10th April, was in 1842 in the height of its power. Chartist newspapers were started, torchlight meetings were held, and on 2nd May a serious riot took place at Birmingham, at which several people were killed. The six "points" of the Charter were Manhood Suffrage, Annual Parliaments, Vote by Ballot, Abolition of the Property Qualification, Payment of Members, Division of the Country into equal Electoral Districts.

**3rd.** *Jamaica captured, 1655.*—This was the only result of a very unfortunate expedition which Cromwell dispatched to the West Indies. The loss of this island was the first blow to the supremacy of Spain in the western seas.

**4th.** *Tewkesbury, 1471.*—The unfortunate Margaret had landed with a large force to assist Warwick, but by a strategic movement Edward compelled Warwick to give battle (Barnet, 14th April). He then had little difficulty in overthrowing Margaret's force at Tewkesbury. The Queen and her son were captured, the latter being cruelly stabbed to death by the Yorkist lords.

**5th.** *Charles surrendered to the Scots, 1646.*—Finding himself defeated in his appeal to arms, Charles attempted to gain by intrigue what he was unable to obtain by force. He promised liberty of worship to Vane and the Independents; but at the same time he was negotiating with the Scots, hoping to obtain their support. His schemes were frustrated by the advance of Fairfax, and being driven from Oxford, he decided to throw himself on the mercy of the Scots.

**6th.** *Lord Cavendish assassinated, 1882.*—Of the many acts of violence perpetrated by the Fenians, this was perhaps the foulest. Lord Frederick Cavendish, the Chief Secretary for Ireland, and Mr. T. H. Burke, the Under Secretary, were brutally murdered in Phœnix Park.

**7th.** *Lord Rosebery born, 1847.*—Born in London, and educated at Oxford, he entered the House of Lords in 1868. He twice became Secretary for Foreign Affairs, and on the resignation of Mr. Gladstone (1894) he succeeded as Prime Minister.

**8th.** *Treaty of Bretigny, 1360.*—By this treaty Edward the Third waived his claims on the crown of France and the duchy of Normandy, but was granted full sovereignty in respect to his ancient possessions of Aquitaine and Ponthieu, as well as his new conquests of Calais and Guisnes.

**9th.** *The Indian Mutiny, 1857.*—Secret agencies had been at work inflaming the native mind against the British rule, and rumours were spread that the cartridges served out for the new Enfield rifles had been purposely greased with cow's fat and hog's lard in order to outrage the religious scruples of both the Hindu and the Mohammedan. Several of the native cavalry at Meerut refused to use the cartridges served out to them, and on 9th May, these men, eighty-six in number, were sentenced to ten years' hard labour, and publicly marched off to the common jail.

**10th.** *The Indian Mutiny.*—The native troops in Meerut now broke into open mutiny, fired on their officers, broke open the jail, and released their comrades. When the European troops rallied, the mutineers fled to Delhi. Here resided the aged King of Delhi, a helpless old man, a pensioner of the East India Company, but still to the native mind the representative of the Grand Mogul, and to him the mutineers fled for protection. Thus, by proclaiming him Emperor of India, the local mutiny became a national uprising.

**11th.** *Death of Chatham, 1778.*—Although Pitt had strongly protested against the taxation of the colonies, he would never consent to the dismemberment of the empire. When it was proposed to grant America her independence, Chatham struggled down to the House on crutches to speak against yielding. "My lords," he exclaimed, "any state is better than despair. Let us at least make one more effort; and if we fall, let us fall like men." On again rising to address the House he fell down in a fit, and expired after a few days.

**12th.** *Strafford executed, 1641.*—"You have left us," said Pym to Wentworth, when the latter deserted the popular side; "but I shall never leave you while your head is on your shoulders." True to his promise, on the assembling of the Long Parliament, Pym moved the impeachment of Strafford; but finding the trial was going in his favour, the impeachment was dropped and a Bill of Attainder moved. This had to pass both Houses and receive the royal assent, like every other Bill; and after hesitating some time, Charles, to his lasting shame, gave his assent, although he had previously written to Strafford, "They shall not hurt a hair of your head."

**13th.** *Hudson Bay Company Charter granted, 1670.*—This charter was granted to Prince Rupert and seventeen associates, giving them the sole right of trading in the waters of Hudson Bay and the contiguous coasts.

**14th.** *Battle of Lewes, 1264.*—Henry the Third having obtained from the Pope a bull annulling the Provisions of Oxford, and freeing him from his oath to observe these Provisions, nothing remained for the reforming party, at whose head was De Montfort, but an appeal to arms. The majority of the barons, however, when they saw the movement supported by the lower and industrial classes, deserted Montfort, who was thus left to face the royal force alone. His superiority as a leader more than compensated for his inferiority in numbers, and the royalists were completely routed, Henry and his son Edward being taken prisoners.

**15th.** *Daniel O'Connell died, 1847.*—Born in Kerry, studied law at Lincoln's Inn, and called to the Dublin bar 1798. He now turned his attention to politics, his two aims being the removal of Catholic disabilities and the repeal of the Union. The first of these aims was carried into effect (April 13), largely through the influence of the Catholic Association, a vast organisation controlled and directed almost entirely by O'Connell. His efforts for repeal were not successful, and his refusal to sanction forcible resistance to the government destroyed his popularity. In 1844 he was tried for fomenting disaffection, found guilty, and fined £2,000. This verdict was, however, reversed by the House of Lords.

*Hexham, 1464.*—Again the Lancastrians in the north raised the standard of rebellion, only to be once more overcome by the superior military skill of Edward the Fourth. The wretched Henry, after wandering helplessly about the country for some time, was betrayed and sent to the Tower.

**16th.** *Battle of Albuera, 1811.*—Wellington continued his successful advance. He dispatched Beresford against Marshal Soult, who was overtaken and completely defeated at Albuera.

**17th.** *Mafeking relieved, 1900.*—The heroic defence of this little, unprotected town, under that gallant and resourceful leader Baden-Powell, is one of the most brilliant episodes in the Boer War.

**18th.** *Eddystone Lighthouse opened, 1882.*—Owing to the erosion of the rocks, the famous old lighthouse of Smeaton, which had stood for over a hundred years, became unsafe, and a new tower was constructed a few yards to the east of the old one.

**19th.** *Death of Mr. Gladstone, 1898.*—Having retired into private life in 1894, his death appealed to the nation as a personal rather than a political loss. Being removed from the fierce arena of politics, one had an opportunity of considering the many-sidedness of his intellect. "He was an essayist, a critic, a Homeric scholar; a dilettante in art, music, and old china; he was a theological controversialist; he was a political economist, a financier, a practical administrator, whose gift of mastering details has hardly ever been equalled; he was a statesman and an orator."

**20th.** *Fair of Lincoln, 1217.*—Lewis, the Dauphin of France, had been invited by the barons to assist them against John; but the death of that king completely changed the aspect of affairs. The barons were unwilling to punish the youthful heir for his father's delinquencies, and one by one they deserted the French camp. The French force at Lincoln was attacked by the English under William Marshal, and fled in hopeless rout.

**21st.** *Treaty of Troyes, 1420.*—The murder of the Duke of Burgundy in the very presence of the Dauphin led the Burgundian party to support Henry, and terms were arranged at Troyes by which Henry was to marry Catherine, the eldest French princess, govern France for Charles, who was insane, and succeed him on his death, thus excluding the Dauphin, the bitter enemy of the Burgundians.

*Manchester Ship Canal opened, 1894.*—Starting near Eastham, it runs along the shore to Runcorn, and then inland to Manchester, the total length being thirty-five miles.

**22nd.** *First Battle of St. Albans, 1455.*—During the illness of Henry the Sixth, the Duke of York was appointed Protector of the realm. On the king's recovery John Beaufort, York's rival claimant to the throne, was liberated from the Tower, where he had been committed by York, and was supported with such vigour and audacity by the queen that York felt compelled to take up arms. At the head of three thousand men he attacked and defeated the royal forces at St. Albans.

**23rd.** *Battle of Ramillies, 1706.*—Once again Marlborough showed what he could accomplish when his military genius was allowed full play, untrammelled by councils of war. In spite of the strong position which the French had taken up, with a wide morass covering their front, Marlborough flung himself upon their right wing and swept along the whole line till it broke and fled in confusion. In an hour and a half the French lost fifteen thousand men, their baggage, and their guns.

**24th.** *Queen Victoria born, 1819.*

**25th.** *The Barons advance on London, 1215.*—John's defeat at Bouvines so weakened his position at home that the barons held a meeting at St. Edmundsbury, where they agreed to demand the restoration of their liberties, and swore, if necessary, to enforce their demand by force of arms. The refusal of the king to sign the Charter drawn up by Stephen Langton was the signal for a general uprising, and the barons, who had assembled at Brackley, advanced on London. The city at once threw open its gates to receive them, and John found himself with but seven knights to support him against the whole nation.

**26th.** *Mutiny at the Nore, 1797.*—Serious disaffection occurred among the sailors stationed at the mouth of the Thames. Although many of their grievances were real and legitimate, they advanced the preposterous claim that the crew should have the right to vote on the movements of the ship. Parker, the ringleader, and seventeen others were hanged, and the rest of the crews submitted.

**27th.** *Habeas Corpus Act passed, 1679.*—This Act was passed to prevent illegal and indefinite imprisonment, its chief provisions being:—1. That every person committed for treason or felony should be tried at the next sessions. 2. That no person should be committed twice for the same offence. 3. That no person should be imprisoned beyond the seas.

**28th.** *Southwold Bay, 1672.*—In accordance with the terms of the Secret Treaty of Dover, Charles declared war on the Dutch. He obtained supplies for carrying on the war by the extraordinary method of closing the Exchequer, and declining to pay either principal or interest on loans advanced to the Treasury. At first the allies were successful, and De Ruyter was defeated in Southwold Bay by the Duke of York.

**29th.** *Restoration of Charles the Second, 1660.*—"It is my own fault," said Charles, with sarcastic humour, "that I had not come back sooner, for I find nobody who does not tell me he has always longed for my return."

**30th.** *Treaty of Paris, 1814.*—By this treaty France was reduced to the limits at which she stood in 1792, Malta was ceded to Britain, and Britain restored all places taken from France and her allies, except Tobago, St. Lucia, and the Isle of France.

*Jeanne d'Arc burnt, 1431.*—After a year's imprisonment, she was tried for heresy before the Bishop of Beauvais, and condemned to the stake.

**31st.** *Johannesburg occupied, 1900.*—After leaving Bloemfontein, Lord Roberts's advance was unopposed by the enemy until the Vaal River had been crossed, when he found the Boers had taken up a strong position on a low range of hills to the south of Johannesburg, and had made preparations for defending the city. The position was carried by a brilliant charge, and the last day of May saw the British flag flying over Johannesburg.

## OUTDOOR LESSONS IN GEOGRAPHY FOR YOUNG STUDENTS.

BY G. G. LEWIS.

IN his *Scenery of England* Lord Avebury says: "The upper part of a river valley is peculiarly instructive. It is a beautiful and instructive miniature. We surprise the river at its very commencement. We can find streamlets and valleys in every stage. A quartz pebble may divert a stream as a mountain does a great river. We find springs and torrents, waterfalls, lakes, and deltas, in the space of a few square yards, and changes pass under our eyes which on a larger scale require thousands of years."

CHILDREN DAMMING A STREAM TO FORM A LAKE.

### Introductory.

Any teacher who has attempted to teach the common definitions of geography to little children must have been struck with the difficulty the young mind experiences in building up a correct mental conception of the geographical forms they are supposed to understand before proceeding to the study of particular countries.

The beautifully-coloured pictures and realistic photographs now at the teacher's disposal make the matter easier than it was twenty years ago, and the use of the sand model allows the subject to be presented in a concrete form.

But some of the more important forces of nature, particularly that of running water, cannot adequately be described or demonstrated within the walls of a classroom. Nothing but an appeal to Nature herself will yield satisfactory examples.

For this reason the writer urges a more general use of the "school journey" in the teaching of geography. Half-days in the country are too often confined to botany and natural history lessons for the older children; whereas there is plenty of outdoor work to be done with the little ones, who will profit equally by it, and their young minds need it more.

### Lessons in the Park.

Teachers in large towns are undoubtedly severely handicapped in this direction, but much valuable work may be done even in the London parks, most of which contain a small lake and island, supplemented in many cases by a tiny stream and waterfalls.

An actual walk round the lake will indelibly impress the fact that a lake *is* a body of water entirely surrounded by land; whilst the ability of the ducks to circumnavigate the island will allow the dullest to understand the meaning of *its* definition. In a good many cases examples of peninsula, isthmus, cape, and bay will be available, though, failing the seaside, the sand model is perhaps a better illustration of these. The peninsula can so readily be converted into an island, and an isthmus tacked on again, capes of all shapes and bays of varying curves can so easily be made, that the sand model is perhaps more effective in these cases than *seeing* an actual peninsula, isthmus, or cape, which is often not convincing enough in outline to the young mind.

### The Work of a River.

But it is in connection with the study of a river and its numerous appendages that outdoor work is most valuable.

The small streams which rise on the sides of almost every hill are most useful, for there we get, as Lord Avebury observes, the whole work and life of a river in miniature. There are few schools in the country that have not some such a rivulet close at hand, ready to serve as a visible text for many an instructive lesson.

A COTSWOLD STREAMLET—A SUITABLE EXAMPLE FOR OUTDOOR GEOGRAPHY WORK.

Take the children right to the head of the stream where it bursts as a spring from the hillside.

It is a good plan to let them take little spades (of the seaside variety), if they possess such toys; for they will thoroughly enjoy the fun of dabbling with the water, and they will thus learn more about the powerful work of river action in one hour than the teacher could impart in weeks of schoolroom lessons.

The *spring* will most probably break out on a bed of clay or some such impervious layer, whereas the rock above should be porous, and let water soak through. It should be easy to collect some of the clay, and, making a little reservoir, show that it really does hold water; whilst the porous nature of the soil above can be demonstrated by pouring water on it, and observing how it soaks through. A whole lesson may well be devoted to these few principles of the spring as the source of a river.

The children will readily observe how the streamlet commences to cut a way for itself down the side of the hill, carrying its detritus with it, and a few questions will elicit from them the cause.

A good deal of fun and instruction, too, will be obtained by damming the stream at a convenient place, so that a small lake is formed.

The young students will soon appreciate the force and strength of running water when they find their obstructions swept ruthlessly away by the little stream. The constant efforts necessary to maintain the dam in a state of efficiency will drive that fact home irresistibly to the biggest duffer in the class.

With the little *lake* thus formed a good many physical geography lessons can be imparted. There is the lake itself. An island can readily be included, an isthmus built across to convert it into a peninsula. Capes, bays, gulfs can be added *ad libitum;* and the interest will be all the greater if the young engineers are allowed to append their own names. Jones Island, Smith Bay, Thompson Cape, Johnson Lake, will "stick" in a way that abstract ideas obtained from maps fail to do.

*Delta.*—The stream running in at the upper end will in a very short time leave a deposit of sand and mud at its mouth, illustrating what happens when a river reaches the sea. With a little encouragement the river may be made to oblige the class with a small delta, thus showing them not only what a delta *is*, but, what is equally important, *how it is formed.*

It is easy to see what a fund of instruction such a lakelet will supply.

Lower down a *tributary* will in all probability be discovered; and here again it should not be difficult to make the more intelligent children see what effect the advent of the newcomer has on the parent stream.

*Why do rivers wind?* This will present an interesting problem for solution.

A small mound will deflect the course of our toy stream, so will the stump of a tree or a large stone.

It will be worth while to insert some obstruction at the side of the stream, and observe the effect of the rushing water on the opposite bank.

If the hill has any considerable slope, *waterfalls* will be in evidence where the stream encounters a harder ridge of rock. If not present, such a barrier can easily be erected, and a waterfall produced. The ridge will probably show signs of wearing in the centre, where the current is swiftest, giving a concrete example of the cutting power of such a soft, harmless thing as water appears to be. Imagination will help the children to see what a big river might do, if a baby stream has so much power.

Where the slope is much broken a series of *rapids* will be in evidence, and by placing a toy boat on the stream the children will at once see the dangers to navigation presented by rapids.

At this point it will be useful to show the use of a *canal.* A little ingenuity should permit of a simple model canal being constructed, and the boat sailed through it without shipwreck.

In the writer's experience the *raison d'être* of canals is one of the most difficult subjects to make clear to the child-mind, even when illustrated with a full-sized lock. But a complete section in miniature made in this way brings the problem down to the level of their grasp.

The enormous force of running water should be constantly impressed on the young students of geography. In observing

the baby stream, they may see how the water carries down mud, sand, and little stones, knocking them one against the other, grinding out the bed and making it deeper, whilst the tiny rivulets come in on all sides when it rains, widening the valley thus being formed. They may thus be led to see that a river does not run down the valley because it is hollow, but that in the majority of cases it has gradually carved out the hollow, and carried the material away down stream to the sea.

It should not be difficult either to trace at least the early life of a *pebble*. The stones in the upper part will be quite angular; a short distance down, some of the corners will be worn off; whilst, if the stream be of any length, the lower parts should contain specimens rounded into gravel, if not smooth pebbles.

It may be urged that much of this work partakes of the nature of physiography; but the wise teacher will not confine the geography lesson to definitions pure and simple. A little nature study of this kind will quicken the powers of observation, and prepare the way for an intelligent appreciation of the actual geography in later years.

Children in the fourth and upper standards may with profit embark on useful experiments designed to estimate the *speed of the current* at different parts of the stream, by means of corks or bottles thrown into it. The middle will be found to run much faster than the sides.

### Hills and Mountains.

Hills and mountains have their lessons apart from their connection with rivers. The terms *summit*, *slope*, and *base* will be easily taught. The advantage of the summit as a view-point; the value of hills and mountains in making scenery; the fact that they are not usually so fertile as plains; that it gets colder as we ascend; that this causes condensation of moisture, producing clouds and rain, may all be *observed*, even if it be thought inadvisable to tax the young minds with the why and the wherefore.

Most hills have quarries carved out of their sides, revealing their structure, and serving to explain the cause of their existence.

The work of mountains as *watersheds* is not often simply enough illustrated in nature to serve as examples to young children. The watershed is one of the few things that can better be explained by small models. Older children should, however, be encouraged to trace the division between river valleys whenever possible. A contour map, built up of sheets of cardboard, will be useful in this connection.

This can easily be done by transferring the various contour lines from the one-inch ordnance maps to cardboard, cutting out the shapes and building them up, first the 50 feet sheet, followed by the 100, 200, etc.

### The Seaside.

Teachers who are fortunate enough to be at the seaside have a wealth of material at their disposal for outdoor geography lessons. They can make sand-hills, rivers, capes, and bays *ad lib.* on the seashore. They can study at first hand the effect of the sea on the coast line, carving out bays, leaving headlands jutting out boldly to the sea. At many places the work of pebble making can be observed in all its stages.

### A Suggestion for the London County Council.

A large proportion of our schools is located in large towns where the parks afford the only chance of open-air work. With kindly thought for the little ones, the London County Council has in many of its parks laid down sand-pits for the children to play in. Most of the London parks at least have a lake and some little stream running into it.

Would it not be possible to make a miniature river-course, showing such things as watershed—source—tributaries—lake, with island, etc.—waterfalls—gorge, letting the river fall into the big lake to represent the sea?

Even if it were not found possible to allow it to be played with, such a stream would be a never-failing source of delight to old and young, and many a profitable half-hour might be spent by the little ones under the guidance of the teacher, learning the lessons so graphically displayed before them.

## WELL-KNOWN TEACHERS AT WORK.

### MR. ROBERT ELLIOTT,

PRESIDENT OF THE BIRMINGHAM AND DISTRICT BRANCH OF N.U.T.

TO interview Mr. Elliott and spend a day in his charming school has been a very delightful and profitable undertaking. Well known as he is in associations and gatherings of teachers in the Midlands, and at the annual conference of the N.U.T., it is a pity his school is not as well known as he is. The ablest and most experienced teacher in the country could learn many things of value from a visit to the Highfield Road Board School, Birmingham.

If the readers of these lines should be prompted to pay a visit there—and they would be cordially welcomed if they did so, provided, of course, they went singly and not all together—it might be as well to say at the outset where and of what nature it is.

The railways of the Midlands find their centre in Birmingham, and the railway stations in that city all lie in the heart that keeps city and suburban districts pulsating together.

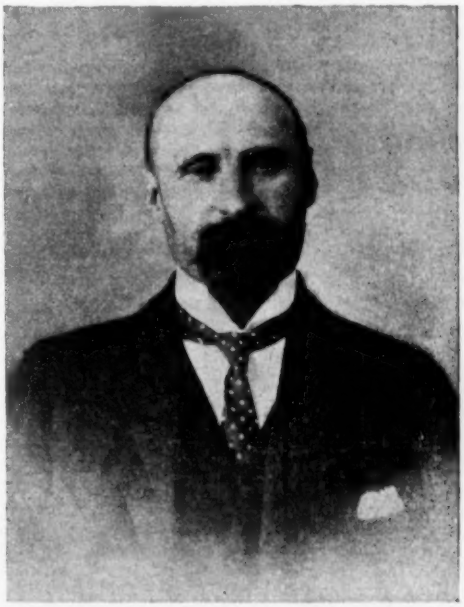

*Photo by]* MR. ROBERT ELLIOT. *[T. H. Deane.*

If you arrive at Snow Hill (G.W.R), you must get across as best you can—and the journey is not far—to New Street Station, where the Midland and the London and North-Western Railways link hands. A train starting from No. 4 platform will hurry through the tunnel and over the viaduct, on to the left branch of lines which leads to the Midland main north line, and in a few minutes make its first stop. Alight from the train, and you are at Saltley, within easy reach of the Training College. You walk through the village—Saltley is still called a village, though its appearances tell you at once that it ought to flourish under another name—and come to Washwood Heath Road. If you try to do so you cannot miss it, for there it is straight to your left. Now climb the hill, and on your right is Highfield Road, three miles or thereabouts from the city. The district is a new one, or comparatively a new one; it is certainly a well-to-do neighbourhood. Even though the spire is only about a quarter grown, you cannot miss the school. The children wending their way to it are a certain guide to its whereabouts. There it is, low-lying, but huge. In former years it was the property of the Aston School Board, and

then it existed only as a school for girls and infants. When the Birmingham borough boundary was extended it was transferred, and under its new owners was taken in hand and enlarged. There are two departments—mixed and infants. It is over the mixed department that Mr. Elliott presides. The average attendance of the children is eight hundred and forty. These are arranged into classes of about fifty each, and a certificated teacher has the direction of their studies.

To get the full benefit of the visit, the writer arrived at the school as the first bell of the morning sounded a quarter to nine. The roads leading to the entrance of the playground were swarmed with children, for the most part from superior homes. The clean collars of the boys, the waterproof cloaks of the girls, and the well-blacked boots of all, betokened well-to-do circumstances. The stranger, being duly "spied," was asked to enter the school and await the arrival of the master. This he willingly did, and employed the waiting moments in looking round.

The hall is the centre of the building; round it are the classrooms; and at each end the cloakrooms—one for the boys and one for the girls. There are not at present many wall decorations in the shape of pictures. This is somewhat of a relief, however; for most of the similar schools under the Birmingham Board have their walls so crowded with framed pictures that you begin to wonder, in looking at them, whether they form part of the fabric. What pictures there are are distinctly high-class and well selected. There

VIEW OF THE HALL.

are cases of stuffed animals and cases of manufacturers' specimens, ornamental, and useful in object lessons and geography teaching. Over the master's desk are ornaments of distinct value in the shape of scholarship and honours boards. These contain the names of boys and girls who since 1894 have won for themselves and their school fame in learning and success at examination. Two of them contain the names of children who have been entered on the foundation of King Edward's Schools. There has been no break in the successes except in one year, and some years show several names. The centre board is devoted to recording special success at the Municipal Technical School. The value of the awards gained amounts to hundreds of pounds; and if the individual success of the children, whose names are gilded thereon, could be followed up and found out, it would no doubt be as amazing as it would be gratifying. One name at least—that of J. J. Holloway, 1895—has appeared in the lists of South Kensington as that of the winner of the National Scholarship for the Study of Mechanics.

Near by is a museum set apart for the children's own contributions. It promises soon to be filled with such specimens as can be got, not only in the city of Birmingham from the manufacturers, but with specimens of various sorts sent to the children by their sailor and soldier brothers from all parts of the world. They are useful rather than ornamental, and are the pride of those who have been the means of procuring them.

In various cupboards are apparatus for use in the chemistry, mechanics, domestic economy, and hygiene lessons. Nor must the school library be forgotten. Nearly a thousand books are in circulation from time to time, and these are suitable to the children from the lowest to the highest class.

Over the clock is printed in bold characters, *Labor omnia vincit*. The reader gathers at once that this is the school motto.

Now the children assemble in the playgrounds, and file into the hall. They march to their accustomed places to the devotional opening service of the day; and, as they march, appropriate tunes are played on the piano by a girl of Standard VII. A hymn is sung, and the Lord's Prayer repeated, each petition being recited by the master first, then by the scholars. When this is over, the classes proceed to their rooms for half an hour's religious instruction.

Like every successful master, Mr. Elliott is anxious for his school. He spends many hours of his private time in scheming and making arrangements that will facilitate the work of the day. With him school is his first and his last consideration. It pays. His schedules of work are well thought out, and are very comprehensive. He has no pet subject in the school, but all branches of work are considered to be of equal value. The consequence is that the work all round is marked with care and thoroughness. The higher up the school you get during a visit, the more you notice the self-reliance of the children, and their ability to enter into their own teaching. There is no shyness, no hesitancy, and no self-consciousness either among the boys or the girls. To a stranger this is very pleasing, and it helps materially to procure points for discussion and argument. At the same time, the children are not too familiar. There is a high tone of character among them; they receive instruction quietly, and enjoy debate with those who question them. Their manner is bright; there is no slipshod or lazy deportment; and both in reading and answering questions clear utterance and refined modulation of voice are praiseworthy features.

The staff is very complete. The Birmingham School Board very wisely grants its head-teachers the privilege of nominating their own assistants, and the consequence is that Mr. Elliott has round him a staff of teachers as near as possible to his own mind as can be. There is an air of refinement, culture, and good training perceptible in them all. Those who have been longest on the staff, and who therefore are more familiar with Mr. Elliott's ways and methods, are really capable men and women, thoroughly equipped in experience and ability to conduct schools of their own the moment it becomes their good fortune to secure appointments. The two senior teachers, Miss Neville and Mr. Thom, are each brilliant and effective workers. In addition to their taking charge of their own classes, Standards VII., they share a good portion of the control and management of the whole school. Mr. Thom is an encyclopædia itself. He teaches mathematics as easily as drawing, and commercial subjects as efficiently as science. At home with them all, he is able to add a *finesse* that is beautifying and very delightful. His lesson in French on the morning of the visit was a treat. Beginning with two or three familiar words and a verb or two—not confined to the regular conjugations—the boys constructed sentences orally, and wrote them with an accuracy that was amazing. As far as possible the instruction was in French. The lesson concluded with tolerably long sentences containing examples of idiomatic expressions that would baffle many older students of French. It was known to Mr. Thom that at the end of morning school the writer of this interview would listen to the singing of the upper classes, and, wishing to know the exact arrangements, he sent a boy to Mr. Elliott, who had by this time gone to another part of the school, with the following oral message:—

"Monsieur Thom présente ses compliments à Monsieur Elliott. Il sera enchanté de savoir si monsieur, le visiteur, préférait écouter la musique dans la salle centrale ou dans la classe."

He delivered the message with readiness and fluency, and carried back the following:—

"Faites-moi le plaisir, je vous prie, d'informer Monsieur Thom que Monsieur H. préfére la salle centrale."

Repeating the sentence over in his mind for a moment or so, he went away saying:—

"Je le ferai, monsieur, avec beaucoup de plaisir. Je vous remercie bien sincèrement."

The conversation shows very clearly how facility in speaking French is acquired.

"CUTTING OUT."

Round the room where this class is taught is abundant evidence of the quality of work done. There are exercises in composition and arithmetic, specimens of drawing and mapping attached to a long show-board on the wall, and several examples of blackboard drawings left from the previous week. What, perhaps, is of even more value than the exhibition of work is the synopsis of marks gained by each boy in the term examinations. Much care has been taken in getting out these results; but a distinct advantage is gained from the fact that each scholar knows his position in the class, and in what subject he either excels or is deficient. The same system is carried out in all the classrooms.

Interesting as this class is, we must leave it and spend a little time in other places. Standard VII. girls are ready for a practical lesson in science. To them we will repair.

Miss Neville is taking this morning the somewhat uninviting but necessary lesson on accidents. On a table in front of the children are bandages and slings and remedies. A girl is supposed to be badly burnt on the lower arm. She is attended to by another girl, who deftly mixes a solution of carbonate of soda, soaks in it a piece of lint, and applies it to the injured place. While this is being done, Miss Neville draws attention to the manner of doing it, and by means of questions keeps the interest of the children to the task of watching the operation. Other injuries are also imagined and dealt with after a similar manner. The scheme of these lessons is an exceedingly valuable and helpful one. It takes the children through a course of practical lessons similar to those sketched by the St. John Ambulance Association. The help of the girls has been required, happily only occasionally, to attend to real accidents which have happened during playtimes, and they have rendered "first aid" with considerable skill. It is a pity that such lessons are not compulsory in all schools.

The three last lessons of the scheme are as follows:—

Sickroom management. Nursing. Schoolroom common ailments. Infectious diseases.

Accidents and injuries: bleeding, cuts, bruises, burns, scalds, falls, and fainting. What to do till the doctor comes.

Children's ailments, etc. Care of infectious diseases of children. Household remedies.

The sewing lessons of this class, too, are thoroughly practical. Illustration No. 2 shows a number of girls engaged in "cutting out." Miss Neville is taking care that the material is not spoilt.

A visit to Standards VI. and VII. on the girls' side of the school does a great deal to strengthen the opinion already formed as to the thorough teaching and able management of the children. In the former class recitation is the subject of the lesson, and in the latter reading. In both there is evidence that teachers and children are of one mind—they have progress and efficiency in view. The enunciation and articulation are particularly clear and good, while the expression is admirable. In the recitation class the girls evinced much dramatic skill. *Julius Cæsar* has been studied during the year, and now towards the end the girls take the characters of the play and repeat their parts. The practice they thus get helps them very much to acquire a clear insight of the play and its meaning.

The composition exercises of this class are truly remarkable. Some of them extend over many pages, and are quite original. This excellence can be traced to the foundation that is laid in the lower classes, where much attention is paid to the way the children answer questions orally and write their exercises. Composition and grammar are linked together and studied as one subject. The exercises on paper are specially attended to, and right through the school the written work is exceedingly neat and accurate. The children write as they think, and blunders and inaccuracies and alterations are few and far between. As far as written arithmetic is concerned, shortest methods are adopted, and as little margin work done as possible. The scheme adopted is a mixture of Schemes A and B. What is used of A is intended to give practice in long work, and B short, quick work. Mr. Elliott has found that when Scheme B is used alone—and this is certainly the popular scheme—the children do not get sufficient practice in dealing with numbers. Hence the combination of the two.

Standard VI. (boys) is a very interesting class. The teacher, Mr. Dunn, is a very strong member of the staff. He has been with Mr. Elliott several years, and knows how to get the best results in the best way. In his science lessons he is helped considerably by the practical methods that are adopted in the object teaching and elementary science lessons in the lower part of the school. The two illustrations showing the science teaching are very similar in character, and convey an idea of what is being done in this direction.

The geography scheme is a complete departure from the Code. It shows the freedom the Birmingham School Board allows its head-teachers. The lower classes combine geography with science, and do a great deal of practical work. Wet sand or sawdust is used as a medium for moulding and modelling illustrations. The dexterity of the children is amazing, and is very gratifying to the teachers who spend so much time on their behalf in preparing and making arrangements for their lessons. Special modelling trays made of galvanised iron are in use, and they are found to be very suitable for the work.

ELEMENTARY SCIENCE, STANDARD VI.

The following scheme of lessons explains itself:—

GEOGRAPHY.

Standards I. and II.—Geography and science combined. Natural phenomena explained and illustrated. Children to do practical work.

# TIME TABLE.

| Class. | 9 to 9.30. | 9.30 to 10.15. | 10.15 to 10.45. | 10.45 to 11. | 11 to 11.30. | 11.30 to 12. | | | 2 to 2.10. | 2.10 to 2.45. | 2.45 to 3.30. | 3.30 to 3.40. | 3.40 to 4. | 4 to 4.30. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | ASSEMBLY, PRAYERS, REGISTRATION, SCRIPTURE. | Arithmetic. | Composition. | RECREATION. | Reading. | Grammar. | | MONDAY. | Physical Exercises. | Boys—Algebra. Girls—Arithmetic. | Boys—Shorthand. Girls—Geography. | RECREATION. | Boys—Drawing. Girls—Reading & Geography. | |
| 2. | | ,, | ,, | | ,, | ,, | | | ,, | Arithmetic. | Boys—Mechanics. Girls—Geography. | | | |
| 3. | | ,, | ,, | | ,, | ,, | | | ,, | ,, | Boys—Mechanics. Girls—Spelling. | | | |
| 4. | | ,, | Word Build. and Compos. | | ,, | ,, | | | ,, | ,, | Spelling. | | | |
| 5. | | ,, | ,, | | ,, | ,, | | | ,, | ,, | ,, | | | |
| 6. | | ,, | ,, | | ,, | Spelling. | | | ,, | ,, | ,, | | | |
| 7. | | ,, | ,, | | ,, | ,, | | | ,, | ,, | ,, | | | |
| 1. | | Arithmetic. | Recitation. | | Composition. | Singing. | | TUESDAY | Girls—Needlework. Boys—Arithmetic and Physical Exercises. Classes 1 and 2—Shorthand and Mechanics. | | | | Reading. | Geography. |
| 2. | | ,, | ,, | | ,, | ,, | | | | | | | ,, | ,, |
| 3. | | ,, | ,, | | ,, | ,, | | | | | | | ,, | ,, |
| 4. | | ,, | ,, | | Reading. | ,, | | | | | | | ,, | ,, |
| 5. | | ,, | ,, | | ,, | ,, | | | | | | | ,, | ,, |
| 6. | | ,, | ,, | | ,, | ,, | | | | | | | Physical Exercises. | |
| 7. | | ,, | ,, | | ,, | ,, | | | | | | | ,, | |
| | | | | | | Boys. | Girls. | | | | | | | |
| 1. | | Arithmetic. | Composition. | | Girls—Reading. Boys—French. | Manual Drawing. | Grammar. | WEDNESDAY. | Physical Exercises. | Boys—Algebra. Girls—Arithmetic. | Boys—Book-keeping. Girls—Dom. Economy. | | Physical Exercises. | |
| 2. | | ,, | ,, | | Reading. | ,, | ,, | | ,, | Arithmetic. | Boys—Mechanics. Girls—Dom. Economy. | | | |
| 3. | | ,, | ,, | | ,, | ,, | ,, | | ,, | ,, | Boys—Mechanics. Girls—Object Lesson. | | Reading. Geography. | |
| 4. | | ,, | ,, | | ,, | Grammar. | | | ,, | ,, | Geography. | | ,, ,, | |
| 5. | | ,, | ,, | | ,, | ,, | | | ,, | ,, | ,, | | Object Lesson. | |
| 6. | | ,, | ,, | | ,, | ,, | | | ,, | ,, | ,, | | ,, | |
| 7. | | ,, | ,, | | Boys—Reading. Girls—Writing. | ,, | | | ,, | ,, | ,, | | ,, | |
| 1. | | Arithmetic. | Reading. | | Girls—Writing. Boys—French. | Singing. | | THURSDAY. | Girls—Needlework. Boys—Science and Object Lesson. | | | | As on Monday. | |
| 2. | | ,, | ,, | | Writing. | ,, | | | | | | | | |
| 3. | | ,, | ,, | | ,, | ,, | | | | | | | | |
| 4. | | ,, | Word Build. and Compos. | | ,, | ,, | | | | | | | | |
| 5. | | ,, | ,, | | ,, | ,, | | | | | | | | |
| 6. | | ,, | ,, | | ,, | ,, | | | | | | | | |
| 7. | | ,, | ,, | | ,, | ,, | | | | | | | | |
| | | | | | | Boys. | Girls. | | 2 to 2.30. | 2.30 to 3.30. | | | | |
| 1. | | Boys—Algebra. Girls—Arithmetic. | Composition. | | Reading. | Physical Exercise. | Grammar. | FRIDAY. | Grammar. | | | | Mapping. | Boys—French. Girls—Geography. |
| 2. | | Arithmetic. | ,, | | ,, | ,, | ,, | | ,, | Girls—Physical Exercises. | | | ,, Geography. | |
| 3. | | ,, | ,, | | ,, | ,, | ,, | | ,, | Boys—Arithmetic and Reading. | | | Reading. | ,, |
| 4. | | ,, | ,, | | ,, | ,, | ,, | | ,, | | | | ,, | ,, |
| 5. | | ,, | ,, | | ,, | ,, | ,, | | ,, | Hand and Eye Training. | | | ,, | ,, |
| 6. | | ,, | ,, | | ,, | ,, | Spelling. | | Spelling. | ,, | | | ,, | ,, |
| 7. | | ,, | ,, | | ,, | ,, | Recitation. | | Recitation. | ,, | | | ,, | ,, |

NOTES.—1. Moral Lesson on Wednesdays, instead of Scripture, 9.5 to 9.30.
2. A Criticism Lesson, at which all the teachers are present, is given on the first Wednesday of each month at 11.30.
3. Registers are marked 9.5 a.m., 2 p.m., and finally closed 9.30 a.m. and 2.30 p.m.

Signed by the Clerk of the Board, Board's Chief Inspector, and His Majesty's Inspector.

Standard III.—Physical geography of England. Special study of its river basins and centres of industry; its ports and trade.

Standard IV.—Physical geography of Europe. Special

ELEMENTARY SCIENCE, STANDARD III.

study of its river basins; its ports and chief centres of trade.

Standard V.—The geography of the rivers flowing into the Atlantic Ocean. The trade of the Atlantic (European and American).

Standard VI.—The geography of the Pacific and Indian Oceans. The river Nile. Trade and commerce.

Standard VII.—The interchange of the productions of the chief countries of the world, especially as regards Great Britain and her colonies. Trade routes and lines of steamers.

Singing is taught by note in all classes on the sol-fa system, and in Standards V.–VII. an introduction to the staff notation is given. Last year the upper children prepared and performed the operetta, "Little Snow White." Several photographs of the scenes of the operetta are on view in the school, and from these it is clear that both children and teachers entered into the spirit of the work with much enthusiasm. The material for the dresses was purchased by the children, the cutting out and arranging were done by the teachers, and the dresses completed at home by the children under the supervision of the mothers. This division of labour was beneficial to the school and home alike. The parents' sympathy with the performance was in this manner obtained from the beginning of the practices, and the children watched the completion of the wardrobe with eagerness and zest. Several choruses from the operetta were rendered on the morning of the visit in a tuneful and

PRACTICAL GEOGRAPHY, STANDARD II.

pleasing manner. The prince still remembers his chief solo, and sings it with exceptionally clear enunciation and considerable dramatic style.

The school is one of the largest of the Birmingham School Board, and it is Mr. Elliott's pride that it is also one of the best in the results of its work. Both His Majesty's Inspector and the Board's Inspector speak highly in its praise, and acknowledge the entire cordiality that exists between master and staff and scholars.

Out of school hours Mr. Elliott is also very busily engaged. If he has a hobby at all, it is going to teachers' meetings. He has been a member of the N.U.T. for twenty years, and has hardly ever been out of office of some kind. The Birmingham and District Association has had the benefit of his advice and experience in its committee meetings for ten years; he is Parliamentary Secretary for East Birmingham (Sir Benjamin Stone's division), and is President of the Association for this year. At the annual meeting held on 28th January he delivered a masterly address, from which his views on current topics could be gathered.

He believes that the new Education Act is in the main a very good thing for the country, and that a beneficial national scheme can be got out of it when the people rise to see the urgency of it. There are at present two hindrances to educational progress—(1) Bad attendance of the children, which is largely to be attributed to the indifference of the parents; and (2) the early age at which children are exempt from attendance. As regards the former, although he would not advocate such methods as are in practice in some Continental countries, he would insist on progressive fines in worst cases, and the desirability of the Government appointing inspectors of school attendance in pretty much the same way as under the Factories Act. Whoever were at fault—let it be committees or magistrates—he would have them brought to book for their delinquencies, and displaced if necessary. As to age, he would like to see children remain at school till they were fourteen years of age. By this time a good foundation of scholarship ought to be laid, and would be laid except in extreme cases of dullness. Exemption standards he would abolish altogether. Mr. Elliott is a friend of the so-called class master and mistress, and he pleaded in his address most eloquently on their behalf. He believes that their remuneration should be enough for their wants and saving purposes without their having to eke out their stipends by slaving in evening schools. Evening work stunts the growth in culture of class teachers, and the day-school children under their charge, who should be their first care, are robbed of their best efforts. He is quite of opinion that the low salaries they earn are not what managers of schools believe they are worth, but what it is customary to pay. This is obviously unfair, and all unfairness should be abolished.

The time table of the school is given on the preceding page.

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INTERNATIONAL CORRESPONDENCE.—We have received from the office of the *Review of Reviews* a copy of *Comrades All*, this being the third annual appearance of this interesting publication. In it we have an account of the movement for putting students of the language of a foreign country into communication with students who are natives of and resident in that country, and who are, moreover, desirous of learning English. From the regular correspondence thus established and maintained, not only does great mutual benefit accrue to the individual, but one step is taken to assure that acquaintance between countries which is essential to the establishment of international friendship and peace. We cordially invite all teachers in secondary schools, pupil-teacher schools, and higher-grade schools in which the pupils are studying either French or German, to get a copy and show it to their pupils, and no persuasion will be necessary to induce them to get a copy for themselves. The text of this annual—consisting as it does of letters written by students who have joined in the scheme, and describing school and social life of young people in different parts of the world—will prove a suitable material for reading in class.

The movement has now assumed such proportions that it is felt necessary to make a change in the organisation. Consequently, as so many teachers have taken up the plan, and under the new Education Act it will be easier to classify our English schools, it is proposed to put *teachers* into communication with one another instead of pairing off *individual pupils*. Lists of teachers requiring correspondents will be issued twice a year, and the matter of pairing off pupils will be more easily arranged.

# PHYSICAL TRAINING.

## A PROGRESSIVE COURSE FOR ELEMENTARY SCHOOLS.

BY H. RIPPON-SEYMOUR, A.C.,

*Chief Instructor, George Watson's College, Edinburgh; Member International Congress of Physical Education, Paris, 1900; Author of "Physical Training," etc.*

NOTE.—The military commands given throughout this course are almost exactly in accordance with the commands in the *Infantry Training, 1902*, and the *Model Course*, except where experience has shown a modification desirable. The alternative command will generally be shown in a footnote, and the teacher is at liberty to adopt either.

### SIXTH LESSON.

**Opening Ranks, Dumb-bell and Physical Exercises, etc.**

(The words of command are in heavy type.)

OPENING OUT, WITH INTERVALS.

The class will be formed in two ranks, as described in 31.

68. "**Full interval from the right, left close—March.**"—The right file will stand fast, the remainder of the class "closing" or moving sideways to their left, taking a pace not exceeding twelve inches. As each front rank pupil obtains sufficient distance, he will raise his right arm, palm of the hand downwards, and turning his head to the right will touch the shoulder of the pupil on his right with the tips of his fingers, taking up his dressing as before described (3). The pupils in the rear rank will each halt with and cover their front rank partner, but will not raise their arms.

69. "**Eyes—Front.**"—(4). The head and eyes will be turned quickly to the front, and the right arm dropped to the side.

If the room or place used for drill purposes is not sufficiently large for "Full interval," the caution, "**Half interval,**" etc., may be given, when the front rank pupils will place their right hands on their hips and touch the arm of the pupil on their right with their elbow, the remainder of the movement being as described above. "**Eyes—Front,**" as before.

OPENING THE RANKS (THIRD METHOD).

70. "**Open out—March.**"—On the command "March," the odd numbers of the front rank will take four paces to the front, the even numbers two, the odd numbers of the rear rank two paces, the even numbers of the rear rank remaining steady (Fig. 1).

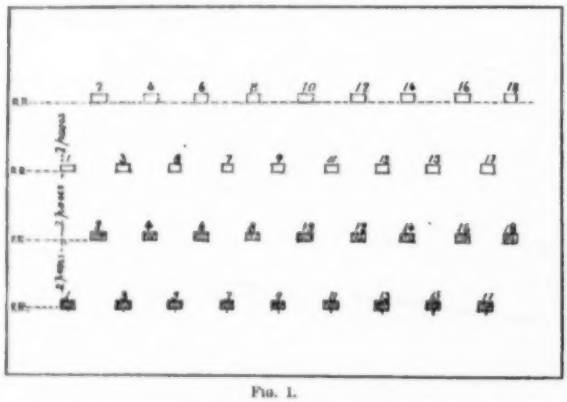

FIG. 1.

If still more space be required (as for Indian club exercises), the number of paces to be taken may be altered at the teacher's discretion—for example, odd numbers front rank seven, even numbers front rank four, odd numbers rear rank three paces.

OPENING OUT (FOURTH METHOD).

This method of opening out will be found of value when the space available is in the form of a somewhat narrow oblong, and when the class is not very large.

The class is formed in single rank (1).

71. "**In threes—Number.**"—The pupils call out their numbers as before described (5), but in threes: one—two—three, one—two—three, one—two—three, etc.

Place the line in the centre of the room (or space) parallel to its greater length, and give the command:—

"**Right—Turn.**"—Class turns as ordered.

"**Open—Out.**"—Numbers "one" stand fast, numbers "two" turn to the right, numbers "three" to the left.

"**March.**"—On the word "March," the numbers "two" and "three" take three paces (or as many as ordered) in the direction they are then facing, halt and turn to their left and right respectively, facing in the same direction as the numbers "one," and in line with each other (Fig. 2).

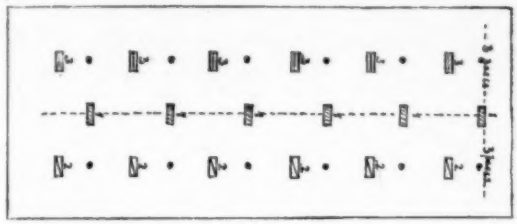

FIG. 2.

If desired, the "twos" and "threes" may be brought into line with the "ones," thus forming "sections" of threes, when they would occupy the positions shown by small dots in Fig. 2.

DUMB-BELL EXERCISES (No. 5).

72. "**Fifth exercise—One.**"—Raise the right hand sideways above the head, the arm straight, bending the body well over to the left, reaching down with the left hand, knees straight, the head thrown slightly back, the eyes directed to the right hand (Fig. 3).

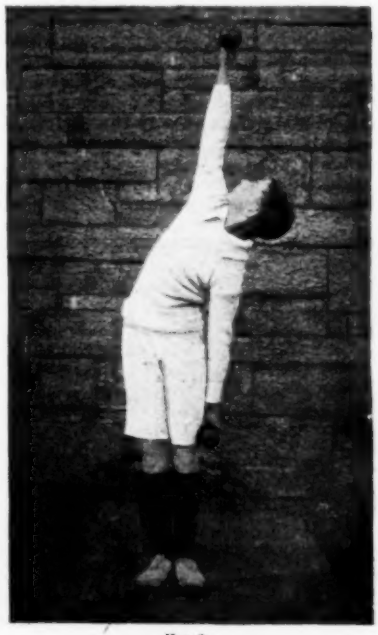

FIG. 3.

"**Two.**"—Lower the right arm, and raise the left as described for the right in "One." The teacher must see that both arms move together after the *first* movement, one

ascending, the other descending; and it is also most important that while the body *must* bend the knees must *not*.

Continue these movements (bending to right and left alternately) until the eighth (or sixteenth) is performed, when the left arm will be above the head.

Fig. 4.

73. **"Fifth exercise, second part—One."**—On the word "One," swing the left hand down past the front of the body, and as it comes in line with the right, raise both hands well above the head, the shoulders turned half to the right, the head slightly back, and eyes directed upwards. From the hips downwards the body should be practically in the position of "Attention," and the heels must not be permitted to leave the floor. The back should be hollowed.

**"Two."**—Swing both hands down with a circular motion from right to left, keeping them close to the body in so doing, continuing the movement upward until the hands are above the head at the left side, in the same position described in "One," substituting "right" for "left."

Continue this movement until seven (or fifteen) is counted, when both hands should be above the head, as described in "One."

**"Eight"** (or **"Sixteen"**).—Throw the hands well outwards and backwards to the sides, and resume the position of "Attention."

DUMB-BELL EXERCISES (No. 6).

74. **"Sixth exercise—One."**—Lunge to the right, as before described; at the same time strike out with the left hand in the direction of the lunge, the left shoulder turned well forward, the right arm bent at the elbow, the hand against the right breast (Fig. 4).

**"Two."**—Draw in the left hand, and at the same time strike out with the right. The "blows" must be made with the full force the pupil is able to exert.

Repeat alternately until fifteen is counted, and on the command **"Sixteen"** draw back the left hand, but do not strike with the right. Both hands should now be at the breast, and twelve or fifteen inches apart.

75. **"Sixth exercise, second part—One."**—Reverse the lunge, as described in No. 57, and simultaneously strike out with *both* hands in the new direction—namely, the left. Both hands should be in line with the shoulder, arms straight.

**"Two."**—Draw both hands back to the breast, in the position described for the hands in "Sixteen" in the first part.

Continue the movements until fifteen is reached, both arms being now extended.

**"Sixteen."**—Drop both arms to the sides, bring the *right* foot up to the left, the left foot not leaving the floor, and resume the position of "Attention," facing in the same direction and standing in the same place as that occupied before commencing the exercise.

76. PHYSICAL EXERCISE (COMBINATION OF NOS. 15, 22, 27, 28, 29).

**"Hands on—Hips."**—(15).
**"Toes—In."**—(22).
**"To the right (and left)—Bend."**—(27).
**"Forward—Bend."**—(28).
**"Backward—Bend."**—(29).
**"Atten—tion."**—Drop the hands to the sides, turn out the toes, and resume the correct position.

"MODEL LESSON" No. 2.

(In giving a succession of commands which follow each other somewhat rapidly, the caution **"Class"** is not absolutely necessary, and may frequently be dispensed with. Words of command containing more than one syllable may be divided by a pause, thus, **"Atten—tion,"** the last syllable being considered as the executive.)

If the reader will compare this "Model Lesson" with the one given in the Fourth Lesson, he will see where the caution **"Class"** may conveniently be dispensed with.

"In two ranks—Fall in" (31).*
"Atten—tion" (2).
"Right—Dress" (3).
"Eyes—Front" (4).
"Class—Number" (5).
"Form—Fours" (34).
"Front" (35).
"Right—Turn" (9).
"Quick—March" (12).
"On the toes—Rise" (43).
"Quick time—Quick" (44).
"For gymnastic march, open—Out" (58).
"High—Step" (59).
"As you—Were" (59).
"Mark—Time" (13).
"Class—Halt" (14).
"Front" (11).
"Open out—March" (32).
"Stand—Easy" (8).

The class may now, if desired, get dumb-bells, and resume their places.
"First exercise, first part—Commence" (46).
"Second part—Commence" (46).
"Third exercise—One, Two, Three," etc. (52).
"Third exercise, judging the time—Commence" (46).
"Stand—Easy" (8).
"Atten—tion" (2).
"Re-form ranks—March" (32).
"Right—Turn" (9).
"Double—March" (38).
"Mark—Time" (13).
"Halt" (14).
"Front" (11).
"Dis—miss" (54).

* The numbers refer to the paragraphs in which the explanation of the commands will be found.

*The author will be pleased to answer in these columns questions of general interest on drill and physical training. Letters should be addressed to the* **Author, care of the Editor,** *and must enclose the coupon on back page of cover.*

ANSWER TO QUERY.

*Rion.*—I think your queries are scarcely of sufficient general interest to be answered here. Kindly send stamped addressed envelope, and I will answer fully. Pleased to hear you find the articles useful.

HER MAJESTY QUEEN ALEXANDRA has been graciously pleased to accept the First Book of the "Union Jack" Series of Readers which has just been published by Messrs. Cassell and Company.

MESSRS. J. M. DENT AND CO. are about to place upon the market a new set of sixteen animal pictures for object lessons, printed in colours true to nature. The sets will be supplied in two styles: on cards, measuring 12½ × 9, eyeletted, in stout envelope, price 3s.; or with wide margins, 15¾ × 12½, costing 4s. 6d. With each set will be included a handbook of notes for teachers.

ONE AND ALL GARDENING, 1903.—We should like to call the attention of our readers, particularly those who live in the country, to this interesting annual. In addition to the introductory article on "The Garden of Life" by the editor, and a translation of the episode in Saintine's *Picciola* referring to the prison flower, there are articles of the highest merit on "Picture Gardens," "The Culture of Sweet Peas," and "Fruit Culture for Small Gardens," by eminent horticultural authorities. There are also interesting papers on "Bible Plants," "Sundials," "Garden Philosophy," "Complete Fertilisers for Gardens," and "Garden Flowers from Seeds," as well as a gardener's calendar and other very useful information. This work, which runs to 200 pages, with about 150 illustrations, is issued at the low price of twopence.

# THE TEACHING OF PRACTICAL GEOMETRY.

BY W. H. FOSTER, B.A. (LOND.), ST. JOHN'S COLLEGE, CAMBRIDGE.

ALTHOUGH practical geometry has for so long a time formed part of the curriculum of nearly all schools, it can hardly be said that the teaching of it has hitherto been as satisfactory as could be desired, especially as the subject is really a very important one. The reason is, I think, not far to seek. There is a tendency with most teachers, when arranging for a course of instruction in a subject, to be guided largely by the mode of treatment to be found in the ordinary text-books. Now, writers of text-books do not always concern themselves with the method of teaching the subject they discourse upon; nor is it at all necessary, or even desirable, that they should in most cases, and it is important that we should remember this. A text-book will generally supply us with the requisite amount and the right kind of matter; but the best way of imparting it, and of arranging it for that purpose, usually requires the exercise of much thought and ingenuity on the part of the teacher, and not much real help is to be got from books.

Nor do I think it has been generally recognised what an excellent instrument for the training of certain faculties practical geometry is in the hands of the thoughtful and skilful teacher. When instruction in it is given on right lines, it may become an excellent substitute for theoretical geometry in schools where this subject is not taught at all; and even in those where the usual mathematical course follows in the higher forms or classes, a course of practical geometry serves as a very suitable introduction to it.

I have endeavoured in this and following articles to formulate a scheme of instruction in practical geometry which shall have the merit of possessing real educational value, and in which, at the same time, the practical aspect of the subject is kept well to the front.

I have had especially in view in this article the needs of those pupils who are absolute beginners in the subject, and I have found from actual experience that the earlier sections of the scheme can be fully comprehended by boys of average ability of about nine or ten years of age. As the course becomes progressively more and more difficult, owing to the introduction in the later sections of less familiar geometrical notions than in the earlier, the scheme lends itself admirably to division into portions suitable for the several divisions of a school; and there is now, I believe, no obstacle even in primary state-aided schools to the introduction of such schemes as this, or any other on the same lines, as a substitute for those which have hitherto been supplied in the various Codes.

The difficulty often experienced in introducing a subject to beginners is a real one, and much of the success or failure of our earlier lessons will depend on the way we begin our subject. We may interest our pupils with the very first sentence we utter, or we may, in the initial stage of the first lesson, create in them a dislike for a subject, which it may be very difficult for them to overcome, though the after-instruction be excellent.

We shall begin our course, therefore, with a sort of preliminary exercise, which, though exceedingly simple, and within the capacity of any child to perform, is at the same time very instructive.

I ought at this stage to suggest that in carrying out such a scheme as I have here outlined, it is not desirable that the beginners should be furnished with any instruments other than a pencil, pair of compasses, and a ruler—that is, a straight-edge. On no account should instruments by which operations other than drawing a straight line, or describing a circle, or transferring a length, be allowed.

With regard to the ruler, it would be a distinct advantage in many ways if it could be marked with both inches and centimetres. The inches should have tenth-inch divisions, and also eighth-inch, but especially the former. The centimetres also should, or at any rate some of them, be divided into millimetres.

The pencils should be kept very well pointed, and for this purpose small pieces of fine sandpaper, glued or gummed on small blocks of wood, would be found extremely useful, and would save much time on the part of the teacher, especially where young children are concerned. Not all teachers realise how much success in this subject depends upon proper attention being paid to this apparently simple matter.

### *Section A.—The Equilateral Triangle.*

EXERCISE 1.—Preliminary.

*Mark any three points on your paper, the distance between any two being not less than about 1½ inches, or 4 centimetres. Draw lines from one to the other with your ruler.*

These instructions may be dictated or written on the blackboard, but preferably the former, especially with young beginners, the teacher going round the class to see what sort of results are being obtained. The difference between a straight line and one that is not straight should be emphasised here, but it is not desirable that any definition should be insisted upon. It is sufficient for them to know that the ruler or straight-edge, if properly constructed, affords a means of drawing straight lines.

A variety of figures will result from this exercise, and it is now the teacher's business to make the class acquainted, to some extent at any rate, with the different forms obtained. He should take a few of the special cases and copy them as nearly as possible, and quickly, on to the blackboard. If any one should happen to have arranged the three points all in the same straight line, special notice should be taken of this; and if no one was so "unfortunate," the teacher should deliberately take this case, as well as one which approaches this limiting position. In this way each pupil gets the advantage of the work of practically the whole class without drawing more than one figure himself.

The teacher now proceeds to inform his pupils that they have all constructed a *triangle* (except, of course, those who placed the three points in one straight line), which is an example of a *geometrical figure*. A figure such as a triangle is termed a *closed* figure, because we have here a portion of the space on our paper completely cut off from the surrounding space. If only two lines had been drawn we should not have got a closed figure, but one which might for convenience be called an *open* figure.

A little discussion might now follow upon the question as to how many lines are necessary to form a closed figure. Can we have a closed figure, for instance, with less than three lines? The pupils should be encouraged to draw examples, if they can, where only two lines are necessary. It may be as well, perhaps, to hint that you do not restrict them to straight lines. We thus get them to realise that two straight lines cannot enclose a space, but that one line that is not straight will suffice—as, for example, in the case of the circle, with which figure they are soon to become acquainted. Much real and valuable knowledge is thus imparted in an easy and natural manner—indeed, the facts are discovered largely by the pupils if the system is properly carried out; and this requires that the teacher should only come to their assistance when absolutely necessary.

Our next step is to get the class to measure the lines that form the triangle very accurately, and to write down their lengths. They should be taught to measure to the hundredth of an inch. This can be done by imagining the tenth-inch divisions divided each into ten parts, or hundredths of an inch, and estimating by eye the place to which the end of the line they are measuring reaches; or they may be allowed to measure to a millimetre, and sometimes to a tenth of a millimetre. What a useful addition such exercises as these would be to the earlier work in decimals! And there is no reason whatever why instruction in decimals should not have been commenced already, and in some such way as is here indicated, or by the use of squared paper, to which I shall have occasion to refer in a later article.

An opportunity is now afforded the teacher of showing how few have had the good fortune to have obtained a triangle with all its sides *exactly* equal, or even with two sides *exactly* equal. The three kinds of triangles—equilateral, isosceles, and scalene—should be referred to here, and examples of each shown to the class. For this purpose it would be a good plan to have well-drawn examples on sheets of paper to hang up before the class; but they must not be introduced before they are needed, or the effect will be spoiled.

It should be pointed out that even those who did obtain an equilateral triangle got it by sheer luck, so to speak; and the teacher will now suggest that the class would perhaps like to try to construct an equilateral triangle. If they cannot find any other way, he will hint that they might make use of their compasses to assist them in the construction of the figure.

Of course it is not likely that all the pupils will succeed in discovering the right method, but some may, and there is certainly no harm whatever, but rather much good, to be got by allowing them to try. They might be told, for instance, that some one found out a way, therefore there is no reason why they should not try to discover it too.

After the attempt has been made, the teacher will, of course, go through the operation on the blackboard, and the class will repeat it, to make quite sure that they all do it by the correct method.

PROBLEM 1.—This last exercise constitutes our first *fundamental* problem—namely, *to construct an equilateral triangle with its sides of a given length.* Three inches or six centimetres would be

a convenient length. It is a mistake to draw these figures too small, and as a general rule each figure should not occupy less than about three inches square in the drawing-book. This I have found from experience to be a convenient size for most problems.

I call this a *fundamental* problem, because it stands in much the same relation to the remaining exercises of the section that a problem in Euclid does to the riders that are based upon it. Each of the succeeding exercises in this section bears a definite and simple relation to the problem; in fact, they all are built up by repeated applications of it.

In order to exercise the ingenuity of the pupils, and to see whether they have grasped the fundamental ideas connected with the equilateral triangle, the problem may be varied as follows:—

*Find three points that shall be equidistant from each other, the distance, say, 3 inches, being given;* or, *find a point that shall be equidistant from the two ends of a line, that distance being equal to the length of the line itself.*

We are now in a position to proceed to the next exercise. It might be pointed out that there is no reason why the triangle in Problem 1 should have been made on one side of the line first drawn rather than on the other, and it is clear that two triangles might be drawn, one on either side of the line. To do this is, in fact, our next exercise.

Exercise 2.—*On both sides of a line 2 inches long describe an equilateral triangle.*

This serves as repetition of the fundamental problem, and at the same time introduces a new figure which is a source of fresh interest to the beginner. It should be noticed, too, that he requires to know nothing beyond the fundamental problem; therefore, if told what to do, he can do it himself, and he sees the product as the result of his own unaided effort. (See Fig. 1.)

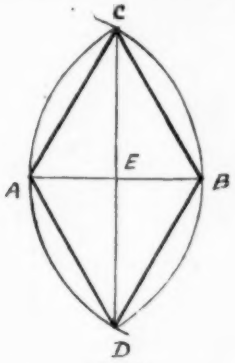


Fig. 1.

It is a good plan in all the exercises to give instructions to the class to draw all the lines at first very faintly, leaving selected ones to be strengthened afterwards at the direction of the teacher. By this means features are revealed at a glance which would not otherwise be very obvious. It has, besides, a practical application of some importance.

In the case before us the four outside lines should be strengthened—namely, AD, DB, BC, CA. We thus get a new figure, which we proceed to examine together. It should be made clear that the figure referred to does not include the line AB; and the example on the blackboard, which the teacher should have been drawing meanwhile *out of view of the class*, need not contain this line.

When asked to express an opinion as to what the figure is, some will almost certainly suggest that it is a square. A square of cardboard or metal is at once brought out—one, too, with its sides the same length as those of the figure under discussion—and compared with it. The class will instantly realise the difference, though they cannot describe it. At this stage it is not desirable to lay too much stress on details. It is sufficient for them to recognise that they have here a new figure which is not a square, and its name is now given—namely, the rhombus. It resembles a square in having all its sides equal. It is a square with its two opposite corners pushed in. I avoid the term "angle" purposely here, and substitute "corner," which serves our purpose quite well at this stage.

We have already a line joining the two corners A and B. This is called a *diagonal*. Another can be drawn from C to D. It should be drawn, and the lengths of the two measured accurately, and written down thus—

The diagonal AB is 2 inches long.
The diagonal CD is 2·83 inches long.
CD is ·83 inch longer than AB.

This is excellent practice, and can be turned to valuable account in many exercises where definite relations subsist between different lines of a figure, as will appear in some of the exercises to follow.

The two diagonals cross each other at the point E. Measure AE and EB, and ED and EC. What do we learn? Are all the lines equal? Could we, by placing our compass-point at E, and taking EA as radius, describe a circle to pass through A, B, C, D? Try it, and see what happens.

Our rhombus is cut up into four *triangles* by the diagonals. The triangles certainly look very much alike. Are they alike? How are we to find out? We might compare their sides. A better plan obviously is to cut them out and place them one on the other. The teacher could do this; or he might have a cardboard triangle equal to one of the triangles, and place it successively on the others. The pupils, too, might repeat the exercise at home on a larger scale, and cut out the triangles. It should be noticed, too, that CD cuts the rhombus into two exactly equal triangles. The equality of these should also be demonstrated in the same way.

This exercise could now be varied. For instance, the class might be required *to construct a rhombus having one diagonal equal to its sides;* or, *to find three points equidistant from a fourth, the distance being given;* or, *to construct a rhombus as in Exercise 2, and divide it into four exactly equal parts, or into two equal triangles in two ways.*

[It is obvious that the triangle DAC is equal to the equilateral triangle ABC, for things which are double the same thing are equal to one another.]

Exercise 2*a*.—Construct an equilateral triangle on a line 1 inch long, as in Problem 1. On each side of it place another equilateral triangle (Fig. 2). (As before, only the outside lines should be strengthened.)

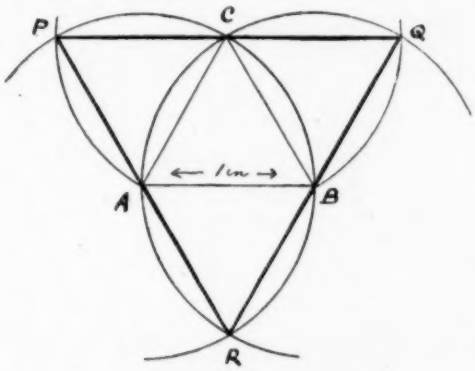


Fig. 2.

Demonstrate that the lines PC, CQ, are really one straight line by holding the straight-edge against both.

C, B, and A are the middle points of the lines PQ, QR, RP.

PQR is, of course, an equilateral triangle.

Problem 1 is repeated in this example three times, with, of course, a different result again. This is a figure of considerable interest. The large triangle is, for instance, four times the original one in area.

If we fold the figure along AC, CB, BA, after cutting the large triangle out completely, we can bring the points P, Q, and R together over the middle of ACB. We thus get the *regular tetrahedron*, a solid which has four *faces* all exactly alike, and which presents the same appearance whichever face it stands on. The difference between solids and plane figures should be dwelt on at this stage. It will be apparent even to a beginner that such a solid as a tetrahedron cannot be made to lie completely in the surface of the paper like the figures hitherto drawn. Solids are themselves bounded by *surfaces*, figures by *lines*. A cube might be conveniently introduced here, and compared with the tetrahedron, of which a good example in cardboard or wood should be available. The faces of the tetrahedron should be compared by placing a cardboard or metal triangle on them of the same size, and similarly with the cube, the square used in a previous exercise being made to do duty again.

The pupils should be encouraged to construct a tetrahedron at home in cardboard, with its edge about 1 decimetre (10 cm.) long. This will be of great use when they come to solid

geometry, to which they ought to be introduced sooner than is usually the case.

The class will easily recognise the now familiar rhombus of Exercise 2 in this figure. It occurs three times. One should be lightly shaded or coloured to render it more conspicuous.

We have seen that the points A, B, and C are midway between the corners of the large triangle. If, then, we had the large triangle, and could find these middle points, we could again get the same figure. If the sides of the large triangle are of some measured length, the middle points could be easily found.

[*Note.*—We are not supposed to be able to bisect a line by a geometrical method at this stage.]

Further exercises on this for practice should now follow. I will suggest one or two only:—

(1.) *Make an equilateral triangle, sides 3 inches long, and cut off a triangle which is just one quarter the size.*

(2.) *From a similar equilateral triangle cut off a rhombus having half the area, or a figure which is three-quarters the area, of the triangle.*

(3.) *Find four points equidistant from a given point.* (This is, of course, only one arrangement of four such points.)

The more practical aspect of the subject might now receive some attention by the introduction of such exercises as are indicated below, pupils being set to copy the figures from large drawings of them, which should have been prepared previously. These should be placed in a conspicuous position before the class. The simpler and more obvious these figures are at first the better. Exercises involving repetitions of them to produce designs should be done at home, and coloured in some simple way. Hints for such designs the teacher could himself give the pupils.

Exercise 2*b*.—Copy the following figures (3, 4, 5).

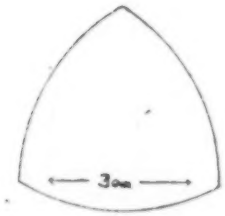


Fig. 3.

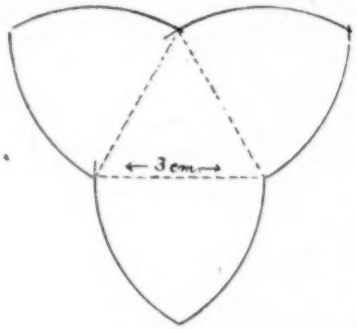


Fig. 4.

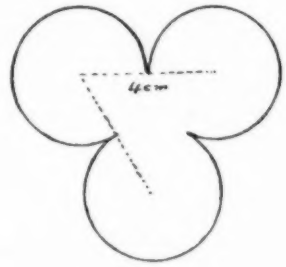


Fig. 5.

Exercise 2*c*.—Construct an equilateral triangle POQ on a line PQ one inch long. Construct another on OP. Call it OPR. Repeat on RO, and continue this as long as possible, going round in the direction of the hands of a clock (Fig. 6).

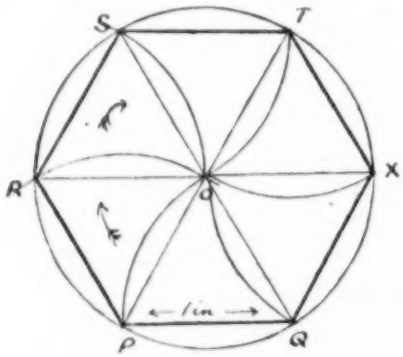


Fig. 6.

(Strengthen only the outside lines as before.) The outside lines form a regular hexagon—a six-sided *closed* figure. Compare with an irregular hexagon. Show the effect of compressing the hexagon from side to side. We shall thus get a hexagon showing some regularity. It would, for instance, be the same on both sides of a median line, but the one we have in our figure is disposed regularly all round a point. Some such explanation as this is necessary, otherwise the terms involved are liable to misuse, and to be not clearly understood. (Of course the radial lines from O are no part of the hexagon proper.)

The pupil should be encouraged to find out all that is of interest in connection with this figure. For instance, he should notice—

(*a*) How many lines there are of the same length.

(*b*) How many equilateral triangles there are.

(*c*) That all the arcs on the outside join together to form a circle with O as its centre.

(*d*) That the corners of the hexagon lie on the circumference of the circle.

(*e*) That the hexagon is made up of three rhombuses like that of Exercise 2.

(*f*) That it is apparently the largest hexagon that can be put in this circle.

(*g*) That a hexagon of the shape of the one referred to above would not have its corners on the circumference.

(*h*) That the lines PQ, PR, etc., the sides of the hexagon (which are here *chords*), are each equal to the radius.

(*i*) That a length equal to the radius can be "stepped" round the circumference exactly six times.

(*k*) The diagonals of the hexagon (of which there are three, and all equal) pass through the centre of this circle. These are therefore *diameters* of the circle.

This is a convenient place to refer to the difference between *diameter* and *diagonal*.

The arc corresponding to a particular chord should be measured (by the teacher) by means of thread laid along it, and compared with the length of the chord belonging to it. It will be found to be longer than the chord, so that, although the radius can be stepped round the circumference six times, the circumference is really more than six times the radius. By rolling metal discs of different sizes along a metre rule carefully, and measuring to a millimetre, it can be shown that the circumference of a circle is 6·28 times the radius—that is, 3·14 times the diameter. (It will simplify the calculation a little if the diameter of the disc is 10 cm., or ten ½ inches.) This is a result of very great importance, and this is a convenient place to refer to it. Use should afterwards be made of it in the arithmetic lessons.

The teacher will find, I think, after pursuing such a plan as this for some little time, that pupils will, without suggestion from him, begin to look for special features in the figures they construct.

The exercise should now be repeated, with the object of obtaining the hexagon only, all *unnecessary* lines being omitted. Thus the difference between constructing a figure by a *practical* method, and by a method which is to enable us to understand the processes by which the result has been arrived at, is made clear to the pupil. This I consider a very useful exercise. It is just here where the usual book method fails for purposes of instruction.

I need hardly emphasise the great importance to be attached to careful and accurate working of the exercises. Unless great attention is given to this part of the work, more than half its value as a school exercise will be thrown away. Some carefully-drawn figures of the proper size should be made by the teacher when the course has reached this stage, and they should be put up, framed, on the walls, as an example for the class to emulate. They will take more interest in figures actually drawn by some one they know than in any they find in books. Children seem to have a notion that what appears in books in the way of diagrams is of the nature of the unattainable, and they naturally experience some discouragement in their attempts to reproduce them. This applies especially to printed copy-book headlines,

which I have more particularly in my mind, and to worked geometrical exercises.

Each of the points enumerated in connection with Exercise 2c will serve as a basis for an additional exercise. A few such exercises I give, leaving the reader to frame others :—

(1.) *Divide the circumference of a circle into six equal parts. Draw lines from each point to the centre.* (This divides the circle into six equal *sectors*. The term should be explained, and also *segment*, the two being contrasted, as in Fig. 7.)

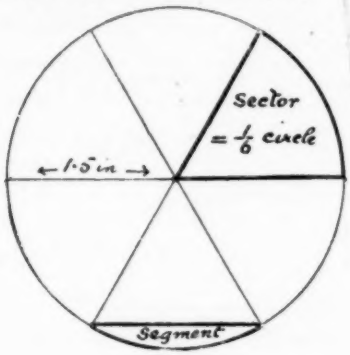


Fig. 7.

(2.) *Describe a circle of radius 1½ inches. Cut out (by lines) a sector which shall be one-sixth of the circle in area.*

(3.) *Find six points distant 1 inch from a seventh, each being also 1 inch from two others.*

(4.) *Divide the circumference of a circle into six equal parts. Join alternate points of division* (Fig. 8).

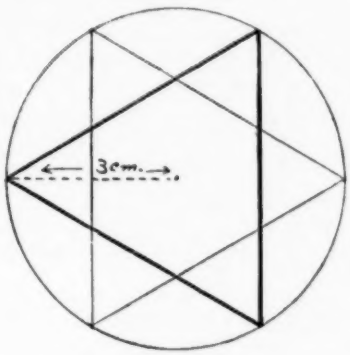


Fig. 8.

This gives us the largest equilateral triangle that can be placed in the circle (inscribed in the circle). Another is possible with the same construction. Draw it. (Fig. 8.)

(5.) *Divide a circle of 1½ inch radius into three equal parts by lines drawn from the centre to the circumference.*

Exercise 2d.—*Copy the figures below* (Figs. 9, 10, 11, 12).

Fig. 9.

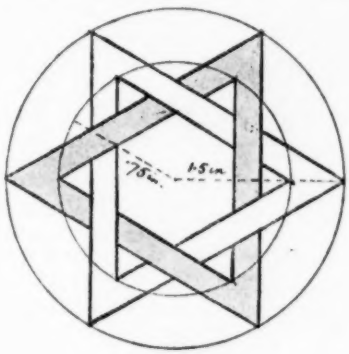


Fig. 10

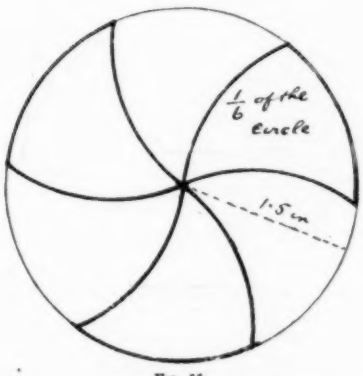


Fig. 11.

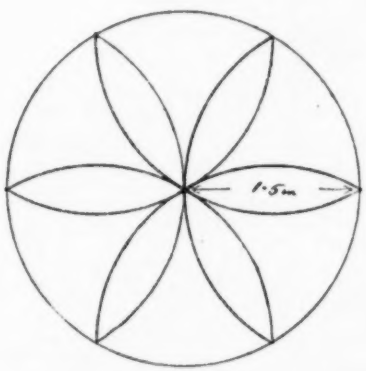


Fig. 12.

Holiday Courses on the Continent for Instruction in Modern Languages.—The Board of Education have just issued a list of sixteen holiday courses which will be held on the Continent at different times during the present year, but mostly in the summer months. Three of the courses are in Germany—namely, Greifswald, Jena, and Marburg; three in Switzerland—namely, Geneva, Lausanne, and Neuchâtel; one is in Spain—namely, Santander; and the rest are in France—namely, Tours, Honfleur, Paris, Grenoble, Nancy, Villerville-sur-Mer, Caen, Lisieux, and Douai. The paper issued by the Board of Education gives the date of each course, the fees, return fares from London, lowest cost of boarding, principal subjects of instruction, address of local secretary, and other details of importance to intending students. Copies of the paper can be obtained free on application to the Board of Education Library, St. Stephen's House, Cannon Row, Whitehall, S.W. Some of our readers speak very highly from personal experience of the courses at Jena, Geneva, Lausanne, Villerville, and Caen.

# OUR TUTORIAL SECTION

## OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

*Principal of the Belvedere Pupil Teachers' Centre, First on Scholarship List; Author of "Scholarship School Management," "Building of the British Empire," etc.*

### NEW SCHOLARSHIP COURSE FOR 1903.

### Fifth Month—May.

**(*N.B.*—I should be glad if students who intend to follow this course regularly would send their names and addresses to me.)**

### Work for the Month.

1. *Reading.*—For special preparation, *Esmond*, chaps. i.–viii. Students will find the New Century Library edition a dainty volume. Some notes and criticisms will be given next month.

General reading must not be neglected. Three or four good books per month should be read.

2. *Repetition.*—This should now be known, but systematic practice, with special attention to modulation and distinct enunciation, is very necessary. The lines selected should not be the only passages of poetry committed to memory; any popular standard poems should be learned.

3. *Teaching.*—Chap. v., *Scholarship School Management:* Spelling.

English spelling is generally regarded as a somewhat difficult subject to teach, but the difficulty lies more in the faulty methods employed than in the subject itself. There *are* difficulties, but they are by no means insuperable. The chief difficulties arise from the fact that the same sound is spelt in many different ways, and that the same letter or combination of letters represent different sounds. One historical cause of the confusion is the Norman Conquest, and the fact that some of our words have come through the Norman-French from the Latin, and others (from the same root) have been taken direct.

The two great essentials for the successful teaching of the subject are—(*a*) proper classification of difficulties, and (*b*) the use of the eye rather than the ear.

With regard to (*a*). If every word that presents difficulty is dealt with indiscriminately as it occurs, the result will be endless confusion. To take one or two examples:—A junior class makes a mistake in spelling *knew*. The teacher will note the cause—the silent *k*. Instead of dealing at once with that word only, the mistake should be noted for the next spelling lesson, which should be devoted to *all* words which contain the same silent initial letter. The confusion often existing between *ei* and *ie* will soon vanish if one or two lessons are devoted exclusively to it. Simple rules, which can be mastered by any child, are given in the text-book.

As regards (*b*). A little thought will show that the majority of words possessed by the student were acquired, not by oral spelling, but by looking. The visual memory is the means by which the word is learned. Every student, I suppose, has sometimes, when in difficulty over a word, written down the possible spellings, and selected the right one. This is a direct appeal to the eye, and sufficiently proves that spelling is best taught by writing rather than by oral spelling.

Word building is a valuable means not only of teaching the spelling but also the meaning of words. In the upper classes, where the chief suffixes and affixes are known, a most interesting, enjoyable, and useful lesson can be given by taking some common Latin or Greek roots and making words from them. Take the root *duco, ductum*, and see what a number of words are formed from it. The class will enjoy this exercise if handled in the right way.

4. *Drawing.*—There is some improvement this month in the specimens sent up, but many students need much practice. The lining-in with the brush is in some cases poor, on account of the inferior quality of the paper and of the brush employed. A medium red sable brush is the best, and the drawing-paper should not be too rough, nor should it be a glazed surface.

5. *Music.*—Syncopation and compass of voices.

6. *Penmanship.*—Ten minutes' practice daily in the *Practical Teacher Copy Book*.

7. *Composition.*—Write one or two essays per week on such subjects as—

(*a*) The character of Rosalind.
(*b*) The rise of the drama.
(*c*) Difficulties of exploration in Africa.
(*d*) Slavery.
(*e*) "Tongues in trees, books in the running brooks,
Sermons in stones, and good in everything."
(*f*) Social life preceding the Peasants' Revolt.
(*g*) Process of any manufacture.

Read the subject up if necessary. Prepare a skeleton plan, write a rough draft, and then carefully polish it to the very best of your ability. Many of the essays submitted for criticism possess the fatal defects of lack of classification of ideas and loosely-constructed, hazy sentences. Many students think that all they have to do with the subject is to sit down, without previous thought, and commit to paper any ideas which come along, in any order and in any style. These will never write an essay worth reading. A man who writes leaders for the great daily papers cannot, after having written hundreds, write without some preparation. Facts, clear ideas, and clear language are absolutely essential.

The subjects given this month are not difficult—

(*a*) Is probably dealt with in the text-book, but no student should be content merely to take some one else's ideas without thoroughly testing and weighing them. Quote lines, if you can, to substantiate any statement.
(*b*) Was outlined in last month's notes.
(*c*) Can be answered easily by any one who has read the history of one of the many expeditions into Africa—for example, Stanley's *How I found Livingstone*. The absence of great gulfs, the rivers with sandbanks at mouth and cataracts in the middle course, the malarial coast belt, the tribal warfares, Mohammedan fanaticism, difficulties of transportation, all tend to daunt any but the most determined.
(*d*) This may be treated in many ways—historically, politically, socially.
(*e*) This subject is cognate with one set last month—nature study—and should prove an enjoyable subject to the thoughtful student.
(*f*) Take the "life" in sections—for example, houses, food, clothing, recreations, etc. Point out the results of the terrible Black Death, produced by the entire absence of all sanitary conditions, the monotony of the food compared with modern supplies, etc.
(*g*) A clear and detailed account of some manufacture carried on in the vicinity would be better than an account taken from a book.

I shall be pleased to give a small prize for the best essay sent in during the month on (*e*).

8. *English.*—(1.) Learn twenty-five roots and meanings per week.

(2.) Prepare thoroughly the grammar and syntax of the *Adverb*.

(3.) *The Task*, Book V., lines 160–192.

(4.) *As You Like It*, Act II., Scenes vi. and vii.

(5.) Chief writers of the Stuart period.

*Notes on English.*

*The Adverb.*

Learn exact definition and classification. The adverb modifies the meaning of a verb, an adjective, another adverb, or anything equivalent to these. Some grammars say the adverb modifies the preposition or conjunction: for example, *close* by the regal chair: *just* when the sun was setting; but it is preferable to consider

*close* as modifying the phrase "by the regal chair," and *just* as modifying the whole adverbial sentence. Note particularly—

(1.) *Wherein*, *whereby*, *wherefrom*, etc., are termed relative adverbs, because they are equivalent to a preposition and a relative pronoun. "The house *wherein* he was born" = "the house *in which* he was born."

(2.) *Here*, in this place; *hither* = to this place; *hence* = from this place.
*Where*, in what place; *whither* = to what place; *whence* = from which place.
*There*, in that place; *thither* = to that place; *thence* = from that place.

"Whence do you come?" is better than the awkward "where do you come from?"

"From whence" = "from from which place," and is incorrect.

(3.) *Yes* and *no*, in answer to questions, are better considered as word-sentences than adverbs. "Have you been to London?" "Yes." Here the word "yes" stands for, "I have been to London," and cannot be said to modify anything.

(4.) Do not confuse the adverbial object with the adverb. "He went *home*," "it is twenty *yards* long," "he came one *night*," etc. Each of these words is a noun in the adverbial objective case.

(5.) *There* is used as an introductory adverb (not adverb of place) in cases where the verb precedes the nominative. "There dwelt a king;" "'There was a ship,' quoth he," etc.

(6.) *The* is an adverb of degree in such cases as "*the* more *the* merrier," "*the* sooner *the* better."

(7.) Some adverbs have degrees of comparison, like adjectives. This is frequently forgotten in parsing.

### "*As You Like It.*"

Act II., Scene vi.—*Thy conceit is nearer death*, etc. You fancy you are nearer death than you are.

*Presently*, immediately.

*Leave to die.* An instance of the infinitive mood limiting the noun.

Scene vii.—*He be transformed* = I think that he be transformed, etc. The use of *be* for *is* is dialectic, and still obtains in Wessex.

*If he, compact*, etc. If he that is composed of discontent and grumbling has become musical, we may expect the music of the spheres to soon become discordant.

*What, you look merrily!* = What! is it possible that *you*, who are always despondent and miserable, look merry?

*Motley*, parti-coloured. The usual dress of the fools was doublet and hose, each half being a different colour.

*Who laid him*, etc. "Him" is here reflexive.

*Dial.* Either a sun-dial, or more probably a watch. *Poke*, pocket.

*Thereby hangs a tale.* The "tale" is not apparent, nor is it intended to be. The saying is an affectation of much wisdom kept in reserve.

*What fool is this!* A natural exclamation. Since fools were only to be found in the courts of the great, and not in the lonely forest, the duke wonders how a fool in his uniform should be in the recesses of the forest.

*Dry as the remainder biscuit.* A dry brain was a dull brain. *Remainder biscuit*, the ship-biscuit remaining after a long voyage.

*It is my only suit*, etc. This and the succeeding speeches must be carefully studied. The meaning, simply expressed, is: "The dress and position of a fool is what I should most desire, if only you will not credit me with being wise. I must have the permission of a fool to say what I like to whom I like, and those that feel my remarks most must be loudest in applause. For if a wise man shows that he feels the truth of a fool's remarks, and does not hide his hurt feelings under the disguise of merriment, he is more foolish than the fool. Let me only have the dress and freedom of speech granted to a jester, and I will undertake to cleanse the world of sin."

"You would only do great wrong in this attempt; for as you have lived a corrupt life, in your attempt to reprove you would make known moral evils to all who are at present ignorant of them. You would resemble a man with a loathsome contagious disease, pretending to cure others when he is merely spreading the infection."

"Not at all. If I attack pride, I am not attacking any particular person, for it is a common failing and everywhere exhibited. Suppose I charge the merchants' wives with wearing dress far too rich for their station, can any particular woman say I mean her, when her neighbour is every whit as extravagant? or if I charge those of lower rank with dressing above their station, and one replies that *I* do not pay for his apparel, is he not admitting that I am right? No one can charge me with personalities. If my remarks do not apply to him, he has wronged himself by thinking they do, when they should have had no effect whatever upon him."

*Art thou thus boldened*, etc. Is it your distress which makes you act so rudely, or are you entirely destitute of good manners and courtesy?

*Inland bred*, brought up in a town—civilised society. The words *civil* (Lat. *civis*, "a citizen"), *polite* (Greek, *polis*, "a city"), *rude* (Lat. *rus*, *ruris*, "the country"), *boorish* (*boor*, "a farmer") all point to the belief that the town man has better manners than the country man.

*Forbear your food a little while*, delay your meal for a short time; *while* = noun, adverbial object.

*All alone unhappy.* *All* = adjective limiting *we*; *alone* = adjective limiting *we*.

*Wherein we play in.* The last *in* is unnecessary. The construction is not unusual in Shakespeare.

*All the world's a stage.* This is one of the best-known passages of Shakespeare. The seven ages of man, as here vividly depicted, have formed the subject of innumerable pictures.

*Mewling and puking*, crying and dribbling.

*Sighing like furnace*, heaving sighs, like the puffing of smoke from a furnace.

*To his mistress' eyebrow.* Illustrating the extravagances of lovers. It may be noted that Jaques has a sneer at man in every age; this is in keeping with his cynical character.

*Full of strange oaths*, which he has picked up while on service in foreign countries.

*Bearded like the pard.* The leopard has not much beard. The comparison is not made as to the *quantity* of beard, but as to its roughness and untidiness. This is in contrast with the "formal cut" mentioned below. The Elizabethans were very particular as to the cut of their beards.

*With good capon lined.* Capon = "a fowl" (Lat. *caponem*). This is a sneer at the justice who receives capons as bribes. "It was the custom to present magistrates with capons, by way of securing their goodwill and favour." "A justice of the peace is a living creature that for half a dozen chickens will dispense with a dozen statutes." Bribery was common in Tudor times.

*Wise saws*, wise maxims, sayings.

*Modern instances*, examples taken from everyday life.

*Pantaloon*, an old fool (from *pantalone*, a ridiculous character in Italian comedy).

*Youthful*—that is, worn in his youth.

*Oblivion*, forgetfulness (Lat. *obliviscor*).

*Sans*, without.

*Song.* The songs scattered through the plays are generally of the highest excellence. The general meaning in this instance is singularly appropriate to the exiled party.

*Unkind*, unnatural.

*The holly* was the emblem of mirth.

*Friend remembered not*—that is, the non-remembering of a friend.

*Residue of your fortune*, the rest of what has happened to you.

9. *Geography.*—(*a*) British South Africa.
(*b*) Revise China, Japan, and Asiatic Russia.

Copy into notebook and learn:—

| Colony. | Area in Sq. Miles. | Population. | Imports. | Exports. | Towns. | Government. |
|---|---|---|---|---|---|---|
| Cape Colony (including the Diamond Fields, Transkei Territories, Bechuanaland, Pondoland). | 276,995 | 2,433,000 | Apparel, iron and steel, cotton and woollen goods, books, coal, leather, machinery, spirits, tobacco, provisions. Value, £21,000,000. | Gold, copper, diamonds, sheep, cattle, ostrich feathers, grain, wines. Value, £10,000,000. | Cape Town, Grahamstown, Port Elizabeth, Kimberley, Beaconsfield, etc. | Responsible Government. Governor, Sir Walter Hely Hutchinson. Legislative Council of twenty-three. House of Assembly of ninety-five. |
| Basutoland. | 10,293 | 250,000 | Blankets, hardware, groceries. | Grain, wool, cattle, horses. | Maseru. | Crown Colony under a Resident Commissioner. |
| Bechuanaland Protectorate. | 400,000 | 500,000 (?) | Blankets, hardware, groceries. | Mealies, wool, hides, cattle, wood. | Palapye, Gaberones. | Protectorate under a Resident Commissioner. |

| Colony. | Area in Sq. Miles. | Population. | Imports. | Exports. | Towns. | Government. |
|---|---|---|---|---|---|---|
| Transvaal Colony. | 119,200 | 750,000 | Mining machinery, railway plant. | Gold, mealies. | Pretoria, Johannesburg, etc. | At present a Crown Colony, but the new constitution provides for a Governor, Executive, and Legislative Council. |
| Orange River Colony. | 48,400 | 210,000 | Hardware, agricultural implements. | Wool, ostrich feathers, hides, diamonds, grain. | Bloemfontein. | At present a Crown Colony, but the new constitution provides for a Governor, Executive, and Legislative Council. |
| Natal (including Zululand and Amakuland). | 29,200 | 1,000,000 | Apparel, carriages, cottons, leather, machinery, metals, provisions, woollens. Value, £10,000,000. | Raw coffee, dye stuffs, hides, skins, wool, goat's hair. Value, £4,000,000. | Pietermaritzburg, Durban, Glencoe, etc. | Responsible Government. Governor, Legislative Council of twelve (nominated), Legislative Assembly of thirty-nine (elected). |
| Rhodesia. | 750,000 | 1,000,000 (?) | Clothing, machinery of all kinds, hardware, provisions. | Gold, silver. | Salisbury, Bulawayo, Umtali, Tuli, Gwelo, Victoria. | Administered by the British South Africa Company (incorporated 1889). |

Note carefully from map the railway lines constructed and projected. Cape to Cairo Railway has been finished as far as Salisbury, and is being made from Bulawayo to the Victoria Falls, passing the Wankies coal district.

In this (and in the revision of China, etc.) draw maps, mark in all chief places, and commit to memory.

10. *History.*—Henry the Fourth to Richard the Third (1485).

Chief points:—

Henry the Fourth.—(*a*) Henry's title. His difficulties, and how they were overcome.

(*b*) Rebellions by the barons—

1400. Glendower's.
1403. The Percies' (Earl of Northumberland; Hotspur, his son, etc.).
1405. Mowbray; Scrope, Archbishop of York; and Earl of Northumberland.
1408. Northumberland. Defeated and slain at Bramham Moor.

(*c*) The Lollards. Derivation either Lat. *lolium* = tares; or from Walter Lolhard, a German reformer; or most probably from *lullen* = to sing. They were reformers who adopted Wycliffe's ideas as to the reform of the church, and added many socialistic ideas of their own. *De Heretico Comburendo* passed against them.

(*d*) Note the constitutional advance under the Lancastrians. As Henry was elected by the Parliament, he had to yield to the demands of the Commons for free speech, control of expenditure, etc. This growing power was checked by the disfranchising Act of 1430, which limited the power of voting to 40*s.* freeholders.

Henry the Fifth.—The French campaign. Agincourt, and the Treaty of Troyes.

The cause of the English success from 1419 to 1435 was not so much on account of the size or bravery of the English armies as because of the alliance of the Duke of Burgundy. The latter, who was little less powerful than the French king, disgusted at the assassination of his father by the French king's orders, allied himself with the English in 1419. The Duke of Bedford married his sister, and thus formed a link between England and Burgundy. When she died, and the duke married, in 1433, Jacquetta of Luxemburg, a vassal of Burgundy, without the latter's consent, the alliance cooled off, and two years later Burgundy became reconciled to France. This is of great importance.

Henry the Sixth.—(*a*) Loss of France, due to above.

(*b*) Cade's rebellion. Causes: Extortions of tax collectors; loss of Normandy; dissatisfaction at the limitation of the franchise.

(*c*) The Wars of the Roses. Prepare an exact genealogical table, showing the descent of the rival families, and a table of the battles.

Edward the Fourth.—(*a*) The kingmaker. The Earl of Warwick had been a stanch supporter of Richard, Duke of York, and on his death had acted as a father to the young Earl of March (afterwards Edward the Fourth). When the latter became king he wished to free himself from this state of tutelage, and his attempts to act without Warwick's advice were regarded by that baron as acts of ingratitude. The causes of Warwick's change of side were: Edward's marriage with Elizabeth Woodville, and the promotion of her relatives; the defeat of Warwick's foreign policy; personal slights to the Nevilles.

(*b*) Edward's alliance for trade with Burgundy.

(*c*) Edward's character—a bold, active, clever general when in the field; a lazy, lascivious king in times of peace.

Richard the Third.—A very able man; not the old villain as usually portrayed. He was only thirty-four at the time of his death. Clever, scheming, and unscrupulous.

Note very carefully the character and results of the Wars of the Roses, especially (*a*) that they affected the towns but little, and (*b*) that they resulted in the destruction of the feudal system.

11. *Arithmetic.*—Revise proportional parts, partnership and averages, and work 200–250 Christian and Collar, general examples.

It will not be necessary to work out all the exercises given on these rules, but students should satisfy themselves that they *can* work every sum. If any difficulty is found, send it up for solution.

12. *Algebra.*—Harder problems. Hall and Knight.

Note particularly in problems referring to numbers of more than one digit that the symbols must be multiplied by the proper power of ten to get the number. Thus, if a number consists of two digits, and you take $x$ for the tens and $y$ for the unit figure, the number is *not* $xy$, nor $x + y$, but $10x + y$. The number with the digits reversed would be $10y + x$.

In problems referring to the hands of a clock, the simplest way of working is as follows:—

For example: At what time will the hands be at right angles between 6 and 7?

Draw a diagram of the face. It will then be recognised that there are two positions—(1) when the long hand is between 3 and 4, and (2) when the long hand is between 9 and 10.

Now, whatever the number of minute spaces the long hand is between 3 or 9, the short hand must be the same past 6.

Let $x$ = the number of minute spaces.

Since the last hour (6) the long hand has gone $15 + x$ spaces, the short hand $x$, and their rates are as 12 : 1.

Therefore, $15 + x : x :: 12 : 1$ (multiply extremes and means).

$$15 + x = 12x.$$
$$11x = 15.$$
$$x = 1\tfrac{4}{11};$$ or the time is $16\tfrac{4}{11}''$ past.

In the second case the long hand has gone $45 + x$ spaces, the short hand $x$.

As before, $45 + x : x :: 12 : 1.$

$$45 + x = 12x.$$
$$11x = 45.$$
$$x = 4\tfrac{1}{11};$$ or the time is $49\tfrac{1}{11}''$ past.

13. *Euclid.*—Revise Props. 40–48, Book I., with six deductions per week.

14. *Science.*—Elementary Chemistry. Mixtures and compounds. Water: its composition, proved by analysis and synthesis; its physical properties. Elementary properties of oxygen, nitrogen, hydrogen.

15. *General Information.*—Work one or two papers each week from one of the books published.

## Notes on the March Paper.

The questions being fairly easy, the papers were generally very good.

1. (*a*) "The old order changeth," etc. (Tennyson's *Passing of Arthur*).

(*b*) "'Twas a famous victory" (Southey's *Battle of Blenheim*).

(*c*) "Our sleep is but a birth and a forgetting" (Wordsworth's *Ode on Intimations of Immortality*).

(*d*) "Storied windows richly dight" (Milton's *Il Penseroso*).

(*e*) "Hope springs eternal in the human breast" (Pope's *Essay on Man*.

(*f*) "There is a tide in the affairs of men" (Shakespeare's *Julius Cæsar*).

(*g*) "We thought her dying," etc. (Tom Hood's *The Deathbed*).

4. In accounting for tides, the misstatement was frequently made that the sun exercised less force of gravitation on the earth than the moon. This is not so. The sun's power is greater, but being much larger than the earth, the power is spread over the whole surface; the moon, being smaller, acts locally, and produces a greater effect.

7. The description of the smelting of iron was usually well done, but several failed to recognise the use of the lime put into the furnace.

### Test Paper on General Information.

The answers to these questions are marked gratis. They should be written on foolscap, on one side only, the coupon of the current number and a stamped addressed envelope for return enclosed. All papers must be sent to Mr. A. T. Flux, The Bays, Belvedere, Kent. A prize of One Guinea will be given to the student securing the highest percentage of marks.

1. Explain the construction and use of the spectroscope.
2. What was the Inquisition?
3. As animals are continually taking oxygen from the air and replacing it by carbon dioxide, why does not the atmosphere become unfit to breathe?
4. On what occasions and by whom were the following spoken?
   (*a*) "They have done for me at last."
   (*b*) "Hast thou appealed unto Cæsar? Unto Cæsar shalt [thou go."
   (*c*) "So much to do, so little done."
   (*d*) "Take away that bauble."
   (*e*) "Shame on a conquered king."
   (*f*) "Remember!"
   (*g*) "They are ringing the bells now; they will soon be wringing their hands."
   (*h*) "The quality of mercy is not strained."
5. In what books do the following characters occur?—Becky Sharp, John Brimblecombe, Torfrida, Falstaff, Minnehaha, Sam Weller, Di Vernon, Sir Roger de Coverley, Friday?
6. Where and what are the Mansion House, the Tower, the Morgue, the Rialto, St. George's Chapel?
7. What is a pendulum? Of what use is the pendulum in a clock? If there are two swings of equal height, and a heavy man is on one and a child on the other, which do you think would swing the greater number of times in a given period?
8. Define exactly a chair, a leaf, a road, the sky, a slope.

### Test Questions on Last Month's Work.

1. *Penmanship.*
   Large Hand.—*Fotheringay Castle.*
   Small Hand.—*Ingratitude more strong than traitors' arms quite vanquished him.*
2. What are the commonest mistakes in reading made by children in the upper standards? How would you correct them?
3. Write an essay on "Every cloud has a silver lining."
4. Analyse the following, and parse words in italics:—

   "The growing wonder takes a thousand shapes
   Capricious, in which fancy seeks *in vain*
   The likeness of *some* object seen *before*.
   Thus nature works *as if to mock* at art,
   And in defiance of her rival powers.
   *Performing* such inimitable feats
   *As* she with all her rules *can* never *reach*."

5. Distinguish clearly between the imperfect participle and the gerund, with examples.
6. What kind of trade is carried on with our West African possessions? What lines of steamers regularly visit the West African ports?
7. What do you know of Edward the First's judicial reforms?
8. Give concisely the causes and results of the Villeins' Revolt.
9. Work the following:—

(*a*) If 14 cwt. 3 qrs. 6 lbs. 9 oz. cost £509, 8s. 3½d., what will 12 cwt. 24 lbs. 15 oz. cost? Ans. £386, 1s. 2¼d.

(*b*) Two pint measures are filled with milk and water. In one the ratio of milk to water is 6 : 1, in the other 7 : 1. If the contents of each are poured into a quart measure, find the ratio of milk to water in it. Ans. 97 : 15.

(*c*) If 18 pumps can raise 2,150 tons of water in 10 days, working 7 hours a day, in how many days will the pumps raise 1,634 tons, working 9 hours a day? How many hours of work is your answer equal to? Ans. 6$\frac{13}{18}$ days; 59$\frac{1}{2}$ hours.

(*d*) A man left £36,288 to be divided between his two sons in proportion to their ages at the time of his death, which were 19 and 23 years. What sum did each receive? What difference would it have made to each if the father had lived three years longer?

Ans. £16,416, £19,872; younger would have had £216 more, elder £216 less.

10. Explain the various ways in which heat may be propagated, with examples.

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## PUPIL TEACHERS' COURSE.

*For Candidates Examination, 1904.*

No alteration has been made in the Code. Books, etc., are dealt with under the various subjects.

1. *Reading.*—One of Scott's novels. Messrs. A. and C. Black publish an excellent and cheap series, fully annotated. *Ivanhoe* or *The Talisman* should be selected. Divide the book into ten portions, and prepare thoroughly one each month. Oral practice is very necessary.

2. *Repetition.*—Gray's *Elegy in a Country Churchyard*. Learn one verse per week; the whole will thus be committed to memory.

3. *English.*—Gray's *Elegy in a Country Churchyard*, and the *Ode on the Spring*. The annotated and interleaved edition by Ralph, Holland, and Co. should be procured.

Prepare verses 1–4 for this month. Analyse the whole; parse every word presenting difficulty.

4. *Arithmetic.*—The work for the examination is arithmetic, including vulgar and decimal fractions, simple proportion, and practice. The text-book recommended is Christian and Collar's *New Arithmetic* (A. M. Holden). This is specially written for teachers, and will serve for all future examinations.

For this month prepare numeration and notation and the four simple rules. The theory must be clearly understood. Pay particular attention to the methods of subtraction, proofs by casting out nines, multiplication and division by factors. How to find the total remainder when, dividing by several factors, there are several remainders—for example, a number is divided by 7, 8, and 9, and the remainders are 6, 7, and 5; what is the total remainder?

5. *Geography.*—General physical features of the globe. The British Isles. The text-book recommended for the British Isles is Blackie's *Descriptive Manual of the British Isles*, with Gill's *Atlas Geography of England*.

For this month prepare "The Physical Features of England." Draw maps, insert all details, names, etc., which are in the text-book, and commit to memory the summary at the back of the book.

This subject will require great care and perseverance. It must be done thoroughly; not merely read through, but learned.

6. *History.*—General outlines of English history.

Text-book, *Outlines of English History*, by A. B. Buckley (Macmillan and Co.).

For this month prepare the history from B.C. 55 to 1066.

Use a notebook; insert chief events, with dates, and learn. Write short lives of Alfred, Dunstan, Harold.

7. *Elementary Science.*—Longmans' *Section I. Physiography*, or Cartwright's *Section I. Physiography* (Nelson and Sons), should be used for this subject, which all candidates should take. The majority of the experiments can be performed at home with simple apparatus.

For this month: Matter, and the general properties of matter.

8. *Music.*—The common major scale, its structure and intervals. *Music for Pupil Teachers* (Nelson), or Stanton's *Pupil Teacher's Notes* (Curwen), should be used.

(Next month a test paper will be given on this work.)

### First Year.

No alteration has been made in the new Code in the subjects for preparation.

1. *Reading.*—One of the Waverley Novels or one of Macaulay's essays.

Take *Ivanhoe* or *The Talisman*, or the essay on Clive or on Warren Hastings.

Messrs. A. and C. Black publish an excellent and very cheap series of the novels, fully annotated. Study the book carefully, learn the meaning of all new words, allusions, etc., and take plenty of oral practice.

2. *Repetition.*—Take the first hundred lines of Cowper's *Task*, Book V., or *The Expostulation*. Prepare 10 or 12 lines each week till known.

3. *English.*—Cowper's *Expostulation*, lines 1–363, or Cowper's *Task*, Book V., lines 1–362.

Text-books.—Cowper's *Expostulation*, specially edited for

pupil teachers (Messrs. T. Nelson and Sons). Cowper's *Task*, Book V. (Ralph, Holland, and Co.).

For this month prepare *The Expostulation*, lines 1–32, or *The Task*, lines 1–32.

Be ready to paraphrase or analyse any part or parse any word. Learn the derivation of all important words. Every assistance is given in the recommended edition of *The Expostulation*.

4. *History.*—William the First and William the Second.

Chief points.—William the First.—(1.) Completion of Conquest. William wished to be considered as a king legitimately elected by the Witan. Hence he did not overrun the country, and only ravaged those parts that rose in rebellion—for example, the west in 1068, the north in 1068 and 1069, the Fens in 1070.

(2.) The results of the Conquest.

(*a*) On the constitution.

(*b*) On the position of the king. (William held all power, and delegated it. The Saxon kings were endowed with it by the people.)

(*c*) The perfection of the Feudal System.

(*d*) Change in the church. (Under Lanfranc reformed and brought more in line with the Church of Rome.)

(*e*) England brought into close connection with the Continent.

(*f*) Norman law took the place of Saxon law.

(*g*) Architecture and knowledge much increased.

(*h*) A strife of races and tongues, resulting in one people and one language stronger and better than either of its components.

(3.) The Feudal System, and all terms, etc., connected with it. Its advantages and disadvantages. Note the modifications of the Continental system which William introduced:—

(*a*) No powerful baron had all his estates in one locality.

(*b*) By the Salisbury Decree of 1086, every man had to swear allegiance to the *king* first; his feudal superior came second.

(*c*) The judicial power of the barons was much more limited.

(4.) The Curfew. Domesday Book.

William the Second.—(1.) The misrule of Flambard.

(2.) The quarrel with Anselm.

(3.) Invasions of Wales.

Digest facts into notebook, and commit to memory.

5. *Geography.*—France and Germany. Prepare thoroughly; learn maps. Imports, exports, and towns are very important.

The government of Germany must be carefully studied. It is a confederation of twenty-five states and a Reichsland (Alsace-Lorraine—an imperial territory). The exact position is best understood by looking at the matter from a historical point of view. On the death of Charlemagne in 814, the vast empire that he had ruled over began to crumble to pieces, and as years went by gradually split up into different independent states ruled by dukes, margraves, electors, etc., the only bond of union being the common language. Throughout the Middle Ages there was an Imperial Diet, or meeting of representatives of the various states, which had little power over the individual states. They chose an emperor, and this office was held for many years by the Hapsburgs, the ruling dynasty of Austria. It was this lack of cohesion which enabled Napoleon to overrun Germany so easily. In 1815 a confederation of states was formed, with Austria at its head and Frankfort-on-Main as the capital. This lasted for fifty years, when Prussia declared war on Austria, and defeated it. A new confederation, from which Austria was excluded, was formed, with Prussia as the leading power and Berlin as the capital. This lasted till the Franco-German War, after which, in 1871, a new constitution was drawn up, the King of Prussia becoming German Emperor. The emperor is commander-in-chief. His edicts, countersigned by the chancellor, have the force of law. The Bundesrath, consisting of the delegates of the confederated governments, and the Reichstag, or legislative assembly of elected deputies, form the parliament.

6. *Arithmetic.*—Averages. Chap. xxxv., Christian and Collar.

7. *Music.*—Continue practice in transposition.

8. *Science.*—Capacity for heat. The construction of the mercurial thermometer.

### Test Questions.

1. Say what you can of the plains of Europe.
2. Describe with a sketch-map the mountain system of Europe.
3. Explain the terms—socland, frankpledge, thane, compurgation.
4. Explain the meaning of the prefixes in the following words—mishap, befriend, withstand, ambiguous, deluge, pellucid, preternatural, retrograde, catalepsy, syllable.
5. Describe experiments to prove expansion by heat of (*a*) liquids, (*b*) solids, (*c*) gases.

## Second Year.

No alteration has been made in the syllabus for 1904.

1. *Reading.*—One of the Waverley Novels or one of Macaulay's essays.

Students should select a book for special study, but should by no means limit their reading to this. *Ivanhoe*, *The Talisman*, or *Old Mortality* should be selected. Oral practice is very necessary.

2. *Repetition.*—One hundred lines from Milton's *Paradise Lost*, Book iii. Learn 10 or 12 lines weekly.

3. *Geography.*—Africa. The states of Africa (other than the British possessions).

Students must understand clearly the terms—Partition of Africa, Spheres of Influence, Hinterland, etc.

Till the later part of the nineteenth century the interior of Africa was unknown, and was a kind of "no man's land;" but since 1885 the European powers have been annexing various parts, till at present the whole country is divided up between them. At first they delimited the seaboard only, and claimed the hinterland (or interior behind it). This vague term has led to endless disputes, and has been the cause of many international treaties. As long as trade was limited to the coast, the different nations did not come into contact; but when traders penetrated into the interior, they began to poach upon other countries' preserves, and hence the necessity for more accurate divisions.

In 1885 Germany annexed German East Africa, the boundaries of which were delimited in 1886, in which year also the German protectorate over the Cameroons was announced. At the same time the Germans annexed German West Africa from the Orange River to Cape Frio.

In 1886 the Royal Niger Company received a charter to administer the basin of the Lower Niger.

In 1886 the British East Africa Company was chartered to develop the land lying to the north of German East Africa.

The Portuguese, who had planted colonies in East and West Africa, claimed as their hinterland all the continent between, part of which was already occupied by the British, and in 1888 a British protectorate over Nyassaland was announced.

In 1890 the Anglo-French Convention settled disputes in the Western Soudan, the Anglo-German settled points at issue in East Africa, and the Anglo-Portuguese delimited the Portuguese possessions.

It must be understood that the parts called German, French, etc., are not *colonised* by those nations; they are merely trade preserves—spheres of influence—to be occupied and developed at the will of the owners. The wishes of the native rulers have not been considered at all in the majority of cases.

Prepare a table similar to that given in the Scholarship Course. Note the chief towns, imports, exports, governments, etc.

The British occupation of Egypt and its results are also very important.

4. *History.*—The Civil War and Commonwealth.

Note Cromwell's foreign policy—vigorous and strong—to make the name of Englishmen feared.

(1.) Navigation Act. War with Holland. Dutch defeated, salute to the English flag conceded, compensation for the Amboyna massacre paid.

(2.) Spain. Free trade with Spanish America, and freedom from the Inquisition claimed. War. Spanish defeated. Jamaica taken.

(3.) France. Commercial treaty signed, after liberty of worship had been given to the Vaudois by the Duke of Savoy.

(4.) Pirate fleet destroyed in the harbour of Tunis.

5. *English.*—Milton's *Paradise Lost*, Book iii. Use Messrs. T. Nelson and Sons' edition, specially prepared for the *Practical Teacher*. Prepare lines 1–101.

6. *Arithmetic.*—Partnership. Averages and percentages. Chap. xxxiii.–xxxvi., Christian and Collar. Work through all the examples, and send up any that present difficulty.

7. *Music.*—Names of chromatic notes.

8. *Elementary Science.*—Next chapter in chemistry.

### Test Questions.

1. Why is Africa called the Dark Continent?
2. Make out a table of the native races of Africa.
3. Give the dates and work of James the First's Parliaments.
4. How did Charles the First obtain money during his period of absolute rule?
5. What were the chief changes in the language effected by the Norman Conquest?
6. Write and explain the three forms of the minor scale.
7. How would you distinguish between a mechanical mixture and a chemical compound? Give examples of each.

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### Answer to Correspondent.

*J. Cater.*— $\frac{10 \text{ cub. m.}}{1 \text{ sq. kil.}} = \frac{10}{1000000} = \cdot00001 \text{ m.} = \cdot001 \text{ mm.}$

The answer given is in both cases correct. There is no objection to your solving a problem by algebraic methods.

# LOGIC FOR L.L.A. AND LONDON MATRICULATION.

BY T. E. MARGERISON, M.A. (LOND.),
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X.

**Cause.**—We have seen that in all induction we assume that nature is uniform. Another equally important assumption is what is known as the *Law of Causation*, which may be simply expressed as "Every event has a cause."

"Cause," in the scientific sense, means much more than what is popularly denoted by the word. Generally, in speaking of the cause of anything, we single out one of the antecedents, and regard that alone as the cause. For example, the cause of a person's death may be said to be poisoning by arsenic; but strictly the cause includes much more—the structure and working of the human body, etc. The real cause is the sum of all the circumstances which must necessarily be present for the event to happen, and it is with this fuller meaning that the logician uses the word.

Logic further postulates (1) that the same cause always produces the same effect, and (2) that the same effect is always due to the same cause. The term "effect" must, however, be interpreted in a similar way to that of "cause," as denoting the sum of the resulting circumstances, and not merely some one or a part only of those circumstances.

**Methods of Induction.**—The various ways in which we may proceed to establish relations of cause and effect inductively have been formulated by Mill as the "Four Methods of Experimental Inquiry." He uses the word *experimental* here in the sense of *experiential*, the methods being based on experience and not on experiment in the strict sense of the word. They are as follows:—

1. The Method of Agreement, and the Joint Method of Agreement and Difference.
2. The Method of Difference.
3. The Method of Residues.
4. The Method of Concomitant Variations.

It will be necessary to examine each of these in detail.

**Method of Agreement.**—This method consists in collecting as many examples of the phenomenon to be observed as possible, and comparing their antecedents. If we find one antecedent or group of antecedents always present when the effect follows, we conclude that to be the cause. Mill illustrates this by taking the phenomenon of crystallisation. "We compare instances in which bodies are known to assume crystalline structure, but which have no other point of agreement; and we find them to have one, and, as far as we can observe, only one antecedent in common—the deposition of a solid matter from a liquid state, either a state of fusion or solution." This invariable antecedent—namely, solidification from a liquid state—may then be concluded to be the cause, or at least the proximate event which completes the cause.

The principle upon which the method is based, when formally expressed, is called the *canon* or rule of the method, and is as follows:—"If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree is the cause (or effect) of the given phenomenon."

The method is essentially one of Observation: we do not experiment with, but merely watch the things observed. It is therefore especially applicable where experiment is impossible, and is usually employed to determine the cause of a given effect.

The method is liable to inaccuracy, owing to what Mill describes as the characteristic imperfection of the method, the Plurality of Causes—that is, the same effect may be the result of more than one cause. Thus death may result from many causes. Consequently it does not follow that if there happens to be one and the same circumstance present in every case examined this is necessarily the cause. To lessen this weakness of the method, the instances chosen should be made as numerous as possible, and it should be verified, when possible, by the Method of Difference. The contradiction between the Plurality of Causes and the postulate noted above, "The same effect has the same cause," arises from the fact that Mill uses "effect" here in its popular rather than its scientific sense.

**Method of Difference.**—Here we take an instance of the phenomenon and an instance where the phenomenon is not present, but which is in every respect but one similar to the first; then that one circumstance in which the two differ is the cause. A familiar illustration is an inquiry into the cause of a draught: the door is open; we close it, and the draught ceases. The open door, the one circumstance present when the draught was felt and absent when it ceased, is concluded to be cause.

The canon of the method is: "If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance in common save one, that one occurring only in the former, that circumstance in which alone the two instances differ, is the effect or the cause, or a necessary part of the cause, of the phenomenon."

The method is essentially one of experiment, and if we can ensure that only the point of difference distinguishes the two instances, then the method gives certain knowledge, and enables us to decide conclusively what is the effect of a given cause. It is, as is seen from the simple illustration given above, frequently used in the inferences of everyday life.

**Joint Method of Agreement and Difference.**—This is not reckoned by Mill as a separate method, as it is really a double use of the Method of Agreement. Two sets of instances are observed—one set positive, where the phenomenon is present, agreeing only in the presence of a given circumstance; and one set negative, where the phenomenon is absent, and agreeing only in the absence of the circumstance which in the first set was uniformly found. If a man finds that he suffers from indigestion whenever he has taken cheese at dinner, and that he does not so suffer when his dinners have not included cheese, he will be justified in inferring that cheese is to blame for his pain.

It will be noticed that in this method we compare two *sets of instances*, whereas in the Method of Difference we compare *two instances*.

The canon of the Joint Method is thus expressed: "If two or more instances of the presence of the phenomenon in question have only in common the presence of one other circumstance, while two or more instances of the absence of the phenomenon have in common the absence of that circumstance only, that circumstance in which alone the two sets of instances differ is the effect or the cause, or a necessary part of the cause, of the phenomenon."

The methods already considered enable us to determine whether two events are or are not connected as cause and effect. They do not show *how much* of any effect is due to a certain cause. When the *quantity* of an effect can be measured, one of the following methods may be employed.

**Method of Residues.**—Here we eliminate known causes and effects, and seek the cause of the *residual* effects among the remaining conditions. The canon of the method is: "Subtract from any phenomenon such part as is already known to be the effect of certain antecedents, then the residue of the phenomenon is the effect of the remaining antecedents."

Almost all the greatest discoveries in astronomy have been made by the use of this method. The method is a modification of the Method of Difference, but the negative instance (where the phenomenon is absent) is obtained by deduction, not by direct experience, for we calculate the effects of the known causes and subtract from the total effect.

**Method of Concomitant Variations.**—This method has the following canon: "Whatever phenomenon varies in any manner whenever another phenomenon varies in some particular manner, is either a cause or effect of that phenomenon, or is connected with it by some fact of causation." It is applicable where some circumstance cannot be removed altogether, but may be augmented or diminished, as, for example, the gravitational and magnetic properties of the earth.

Like the preceding method, it is a modification of the Method of Difference; instead of observing the result of the introduction of a new circumstance, we note different degrees of a given circumstance.

### QUESTIONS.

(Students can have their exercises corrected by sending them to the Editor, Logic Course, PRACTICAL TEACHER, and enclosing seven stamps.)

1. Explain the terms *Law*, *Uniformity*, *Cause*. Examine the use of the word *cause* in the following:—
   (*a*) The cause of his mistake was ignorance.
   (*b*) The cause of the fall of a stone is the law of gravitation.
2. What is meant by the Plurality of Causes? Give instances of effects which may be due to various causes.
3. What is the Joint Method? In what respects does it resemble (1) the Method of Agreement; (2) the Method of Difference?
4. Which of the Inductive Methods are best adapted to Observation, and which to Experiment, and why?
5. Show how the Method of Residues and the Method of Concomitant Variations are modifications of the Method of Difference. Give three instances of concomitant variations which you may assume to be casually connected.

# OUR CERTIFICATE COURSE FOR 1903.

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## TEST QUESTIONS ON LAST MONTH'S WORK.

### Theory of Teaching.

1. Give some reasons for including physical exercises in the course of school discipline, and describe the best system of drill with which you are acquainted. (Cert.)

2. Describe the forms of physical drill which are most appropriate for the boys or girls of the upper division of a school. (Cert.)

3. What symptoms would lead you to suppose that a child was suffering from measles, whooping-cough, and scarlet fever respectively? For how long should a child be excluded in each case?

### English Language and Literature.

1. What are the characteristics of the period covered by the third book of the *Golden Treasury*?

2. Write short accounts of the life and writings of Gray, Burns, and Cowper.

### English History.

1. Describe the most important Acts passed in the reign of William the Third.

2. Trace the course of the War of the Spanish Succession. For what reasons and with what results did England engage in it?

3. Explain the circumstances which led to the establishment of legislative independence in Ireland in 1782, and to the Act of Union. Give the chief provisions of the Act.

### Geography.

1. Give an account of the Canadian Pacific Railway.

2. Name and indicate the positions of the lakes connected with the St. Lawrence and the Nelson respectively.

3. Write a brief description of the mountain system of North America.

### Arithmetic.

1. Find the number which, when divided by 264 by short division (taking its factors 3, 8, 11), gives a quotient 3562, and 2, 3, 6 as successive remainders.

2. A trustee invested £8400 at compound interest for 3 years at 5 per cent. per annum; but being dissatisfied with the security, he then invested the sum, together with the interest which had accrued, in railway debentures paying 6 per cent. at 189. What income did the debentures produce?

### Algebra.

1. Two numbers are in the ratio 2 : 5, and if 6 is added to each they are in the ratio 4 : 7. Find the numbers.

2. If $\frac{x-y}{a} = \frac{y-z}{b} = \frac{z-x}{c}$, and $a$, $b$, and $c$ are unequal, show that $a + b + c = 0$.

3. If two weights are connected by a string which passes over a fixed pulley, the space described in a given time varies directly as the difference between the weights and inversely as their sum. If 9 ounces raise 7 ounces through 8 feet in 2 seconds, how high will 12 ounces draw 9 ounces in the same time?

### Euclid.

1. Prove that the feet of the perpendiculars from any point in the circumference of a circle on the three sides of an inscribed circle are in the same straight line.

2. Determine the distance from the centre of a circle of a point such that, when tangents are drawn to the circle, the concave part of the circumference may be double that of the convex.

### Elementary Science.

1. Describe, with examples, the different modes by which heat may pass from one body to another.

2. Why do you see fringes of colour if you look at a candle flame through a prism, and not if you look at it through a piece of plate-glass held obliquely?

## NOTES AND SYLLABUS FOR MAY.

### English Composition.

Read once more through Nichol's *English Composition*, and prepare essays on the following subjects:—

1. Imperialism.
2. "Mine be a cot beside the hill."
3. "O Solitude! where are the charms
   That sages have seen in thy face?"
4. The pleasures of gardening.

### School Management.

Study the methods of teaching drawing. The objects are to train the powers of observation, for no one can draw without carefully observing the thing to be drawn. In considering this, the student may learn from children's drawings what are the essential qualities of a good observer; for children draw what they have observed, and frequently attach undue importance to quite a minor detail. They also frequently combine observations so as to produce a wrong effect: for example, having correctly observed that a man has two eyes, and having also noticed the form of the outline of a face seen in profile, they will draw a face in profile, and then mark in two eyes. Co-ordination is also achieved through a training in drawing. The visual memory may also be developed. Drawing also affords a pleasant change from the other work. Drawing leads children to appreciate things that are beautiful by calling their attention to such things as symmetry and proportion, upon which beauty depends. Of the utilitarian value of this subject very little need be said. The student should prepare an account of the advantages and disadvantages of each branch of school drawing—freehand, freearm, brushwork, geometrical drawing, and model drawing. The following may be taken as a type of the questions that may be asked:—

"The New Code attaches special and increased importance to the study of drawing in schools. Describe some of the earliest exercises which should be given in drawing, and say in what relation they stand to a good and complete course of general education."

The back work in this subject should now be revised. Read through the text-book once again, and compare with your notes.

### English Language and Literature.

Finish reading the *Golden Treasury*. The fourth part of the *Treasury* deals with the poetry of the first half of the nineteenth century; and it is well to bear in mind the great political movements that were influencing the thoughts of all, particularly of the poets. The French Revolution may be assigned to the previous century, but its influence was marked in the opening of the nineteenth. Literature had been under a despotism as rigid as the political one, and the beginning of the nineteenth century marks the revolt against it and the beginning of literary freedom. The contrast is quite marked between the cold, critical poetry of Book III. and the passionate expression of feeling to be found in Book IV. The student should read the Prelude to Wordsworth's *Excursion*, and see how the poet describes his own awakening, which he connects with the epoch-making event—the fall of the Bastille.

"The potent shock
I felt: the transformation I perceived,
As marvellously seized as in that moment
When, from the blind mist issuing, I beheld
Glory—beyond all glory ever seen,
Confusion infinite of heaven and earth,
Dazzling the soul. Meanwhile, prophetic harps
In every grove were ringing, 'War shall cease;
Did ye not hear that conquest is abjured?
Bring garlands, bring forth choicest flowers, to deck
The tree of Liberty.' My heart rebounded;
My melancholy voice the chorus joined."

The eighteenth century had insisted on well-balanced couplets, and had condemned the ballad as trivial. What can be more truly poetic than the little poems in this metre—Nos. CCXX., CCXXI.? Campbell modified this form by adding an unaccented syllable to the second and fourth lines, thus making them "feminine" instead of "masculine" rimes—for example, CCXLI. and CCCXXXII. The period also saw the revival and perfection of the sonnet, and this form of poem is particularly well illustrated in our collection.

Revise *Richard III.*, paying special attention to the meaning of words and phrases; and be prepared to illustrate the characters, especially that of Richard, by quotations.

### English History.

Prepare the history of England from 1800 to the death of Queen Victoria. The following questions from certificate and other public examination papers will serve as a guide in reading:—

1. Give some account of the war with the United States, 1812-14. How was the conflict ended?

2. How far did the French Revolution affect the conduct of British affairs?

3. What were the chief results to Britain of the Napoleonic wars?

4. What caused the Peninsular War? Explain the reasons for, with some account of, Britain's share in it.

5. Say what you know about Pitt (1) as a finance minister, (2) as Prime Minister during a great war.

6. What were the chief conditions of the second Treaty of Paris, 1815? Which of them were afterwards nullified? Why was the peace followed by great commercial distress?

7. Name the possessions that we acquired during the Revolutionary and Napoleonic wars, and state from whom they were acquired.

8. What were the chief causes of popular discontent in England between 1815 and 1832?

9. Sketch the struggle for Parliamentary reform during the reign of William the Fourth.

10. Sketch the legislative reforms effected by the first Reformed Parliament.

11. Describe briefly the laws dealing with education that were passed during the reign of Victoria.

12. What causes led to the Crimean War? Name the chief events in the war, and summarise the results of it.

13. Sketch the progress of British colonial extension during the reign of Victoria.

14. Write short lives of Earl Beaconsfield and Mr. Gladstone.

15. What events led to the establishment of British control in Egypt? What benefits has Egypt received from that control?

### Geography.

Finish the geography of America and of Australasia. Pay particular attention to the federation of the North American Provinces into the Dominion of Canada, and of the Australian Colonies into the Australian Commonwealth.

### Arithmetic.

Revise the theory of all back parts in which you feel weak. Work exercises in those parts, and send up difficulties. Read *Christian and Collar's Arithmetic*, chapters xxviii., xxxiv., and lvi.–lix. These will explain the method of dealing with most of the types of problems that are set in arithmetic examinations, and practice should be taken in the exercises following those chapters.

The following are solutions to some of the questions set last year:—

1. A teacher wrote on a blackboard the following statements:—

$$(1.)\ 12 : 8 :: 10 = \frac{8 \times 10}{12}.$$

$$(2.)\ \frac{\frac{1}{2} + \frac{3}{4}}{5} = \frac{5}{4} = \frac{5}{4} \div 5.$$

Correct the statements and point out the errors.

The first statement affirms, first, that 12 divided by 8 is equal to 10; and, secondly, that 10 is equal to $\frac{8 \times 10}{12}$ (that is, to $6\frac{2}{3}$). Both of these are absurd. A proportion must consist of *two* ratios, the four dots being a sign of equality between them. In the above, the consequent of the second ratio is omitted.

In the second case there are also two incorrect statements made, because although $\frac{1}{2} + \frac{3}{4} = \frac{5}{4}$, yet $\frac{\frac{1}{2} + \frac{3}{4}}{5}$ is not equal to $\frac{5}{4}$. Again, $\frac{5}{4}$ is not equal to $\frac{5}{4} \div 5$. The two examples show the importance of reserving the sign of equality for use between those quantities only which are equal. Remember that it makes a statement, and should not be used at random.

2. Prove that a vulgar fraction is correctly reduced to a decimal by dividing the numerator by the denominator.

Find the value correct to four decimal places of the error made in taking the first three places of the decimal fraction equivalent to $\frac{9}{17}$ as the exact value of the fraction.

The first part of this question is simple enough. (See text-book.) The second is a little ambiguous. An error may be estimated either absolutely or in relation to the quantity on which the error has been made. If the former were what the examiner meant, it is only necessary to obtain the value of $\frac{9}{17}$ correct to four decimal places, and substitute noughts for the first three digits. Thus to four decimal places $\frac{9}{17} = \cdot5882$, but if we take the value to three places only we have $\cdot588$, which is $\cdot0002$ less than the first value. If we adopt the other method of estimating the error, the simplest way to work is to use a vulgar fraction of the last order of digit set down to indicate the remainder. Thus, $\frac{9}{17} = \cdot588\frac{4}{17}$, where the $\frac{4}{17}$ indicates not $\frac{4}{17}$ of a unit, but $\frac{4}{17}$ of a thousandth, since the second 8 stands for 8 thousandths. The error is therefore $\frac{4}{17}$ of a thousandth—that is, $17\frac{4}{000}$; and putting this as a fraction of the true value, we obtain $\frac{17\frac{4}{000}}{\frac{9}{17}} = \frac{4}{10000} = \cdot0004$. And this result is not merely the value of the error correct to four decimal places, but is the absolutely correct value of the error as a fraction of the quantity of which it is an error.

3. In multiplying a certain number by 4876, commencing from the right, the partial product obtained by multiplying by 8 was accidentally placed a digit too far to the left, and the partial product of 4 was placed consistently with that of 8. The answer was 293068800 greater than the correct answer. If the working was otherwise correctly performed, what was the multiplicand?

The answer obtained was the same as it would have been if the multiplier had been 48076. Now the difference between 48076 times and 4876 times a number is (48076 − 4876) times the number. 48076 − 4876 = 43200.

∴ the multiplicand was 293068800 ÷ 43200.

Ans. 6784.

4. Calculate in the least laborious way—

(1) The cost of 720 articles at £7, 7s. 7d. each.

(2) ·2421 ÷ 125.

(3) The missing terms in 17 miles : 17 yards : : $x$ : 7,
17 miles : 17 : : $x$ : 7.

(1) Since 720d. = £3, 720 articles at 1d. each cost £3; so 720 at 7d. cost £21.

Again, 720s. = £36; ∴ 720 articles at 7s. cost £252, and 720 at £7 cost £5040.

∴ total cost = (£21 + £252 + £5040) = £5313.

It might also be done by taking, first, 720 at £7; then 720 at 7s. = $\frac{1}{20}$ of this, because 7s. = $\frac{1}{20}$ of £7; and the cost at 7d. will be $\frac{1}{12}$ of this result.

(2) Since 125 = $\frac{1}{8}$ of 1000, we multiply by 8, and divide by 1000, the last operation being performed by altering the position of the digits. Ans. ·0017368.

(3) In the first proportion we have to find a number which contains 7 the same number of times as 17 miles contain 17 yards. Since 1 mile contains 1 yard 1760 times, 17 miles contain 17 yards 1760 times; therefore the missing term will be 1760 × 7—that is, 12320.

The second part of this is a catch, because there can be no ratio between a length (17 miles) and an abstract number.

5. On account of a reduction of 3d. in the tea duty, the wholesale price of tea is reduced from 3s. 6d. to 3s. 3d. per lb. A retail dealer who formerly sold at a gain of 25 per cent. also reduces his price 3d. What profit per cent. does he now make?

At first the retail dealer paid 3s. 6d. and sold for $\frac{125}{100}$ of 3s. 6d. —that is, 4s. 4½d. After the reduction he buys at 3s. 3d. and sells at 4s. 1½d., so his profit is 10½d. on 3s. 3d.—that is, $\frac{10\frac{1}{2}}{39}$ of 100 per cent. Ans. $26\frac{11}{13}$ per cent.

6. The simple interest on a certain sum for 5 years is £25. The true discount for the same time at the same rate per cent. simple interest is £20, 16s. 8d. Find the principal and the rate per cent.

Remember that the difference between simple interest (or banker's discount) and true discount is equal to the interest on the true discount.

Since £4$\frac{1}{6}$ is the interest on £20$\frac{5}{6}$ for 5 years, the interest on £100 for 1 year is $\frac{100}{20\frac{5}{6}}$ of $\frac{1}{5}$ of £$\frac{25}{6}$;

that is, $\frac{600}{125}$ of $\frac{1}{5}$ of £$\frac{25}{6}$ = £4. ∴ rate % = 4.

∴ the sum on which the interest for 5 years is £25 is $\frac{1}{5}$ of $\frac{25}{4}$ of £100 = £125.

7. By transferring four-elevenths of my money from the Two per cents. at 80 to the Four per cents. at 120, I increase my income by £1, 13s. 4d. What sum of money had I originally invested?

The question was badly worded. The data will enable one to find how much Two per cent. stock I held, but not what sum of money I had invested originally, because the price of the stock when the investment was made is not given. It might be assumed to be 80, but the assumption is quite unwarranted.

For each £1 realised by the sale of Two per cent. stock there is a loss of £$\frac{3}{80}$ in income—that is, 6d.

For each pound invested in the Four cent. stock there is a gross gain of £$\frac{4}{120}$ in income—that is, 8d.

∴ net gain on every pound transferred = 2d.

$$\therefore \text{number of pounds transferred} = \frac{\text{£1, 13s. 4d.}}{\text{2d.}} = 200.$$

Since £200 is $\frac{4}{11}$ of my money, my money = $\frac{11}{4}$ of £200 = £550.

### Algebra.

Although the theory of indices and surds is not named in the syllabus, the student had better master the chapters on these two subjects.

The proofs are all remarkably simple, and are based on first principles. I shall be pleased to answer any questions or solve any difficulties if sent in by post, with stamped addressed envelope for return. The meaning of $a^0$ is generally a stumbling-block with beginners, although the algebraical proof is simple, being based upon the division of any power of $a$ by itself.

$a^m \div a^m = a^{m-m} = a^0$ (by rule of indices); but $a^m \div a^m$ (or any other quantity divided by itself) = 1.

$\therefore a^0 = 1$.

It will probably assist the student if he will remember that the index shows how many times the letter over which it is written occurs as a factor in a given term. When we multiply $b^2$ by $a^3$ we introduce three factors $a$ into the term $b^2 \times a^3 = a^3b^2$, so $b^2 \times a^0 = b^2$, for we introduce no factors $a$, and consequently the term remains as it was—that is, it has been multiplied by 1.

The following are from last year's paper:—

1. Find the values of $p$ and $q$ in order that the coefficients of $x^2$ and $x^3$ may vanish in the product of $x^2 - 2px - q$, and $x^3 - 4x^2 + 5x - 3$.

It is not necessary to find the whole product, but only to multiply those terms whose products will involve $x^3$ and $x^2$. The terms involving $x^3$ are—

$5x^3 - 8px^3 - qx^3$—that is, $(5 - 8p - q)x^3$.

Those involving $x^2$ are—

$-3x^2 - 10px^2 - 4qx^2$—that is, $x^2(-3 - 10p - 4q)$.

We then have to write these respective coefficients equal to nought, and solve the equations thus formed, multiplying the first by 4.

$$\begin{cases} 5 - 8p - q = 0. \\ -3 - 10p - 4q = 0. \end{cases} \qquad \begin{cases} 20 - 32p - 4q = 0. \\ -3 - 10p - 4q = 0. \end{cases}$$

Then subtracting the second from the first, we obtain—

$$23 - 22p = 0. \quad \therefore p = \tfrac{23}{22} = 1\tfrac{1}{22}.$$

Substituting this in the first equation—

$$5 - \frac{4 \times 23}{11} - q = 0;$$

$$\therefore q = 5 - 8\tfrac{4}{11} = -3\tfrac{4}{11}.$$

2. Solve the equation—

$$\begin{cases} \sqrt{x} + \sqrt{y} = \sqrt{x + y + 6} \\ x - 3y = 6. \end{cases}$$

Square both sides of the first.

$$x + 2\sqrt{xy} + y = x + y + 6;$$

$$\therefore \sqrt{xy} = 3,$$

$$\text{and } xy = 9.$$

But from the second equation, $x = 6 + 3y$;

$$\therefore (6 + 3y)y = 9;$$

$$\text{that is, } y^2 + 2y - 3 = 0;$$

$$\text{or, } (y + 3)(y - 1) = 0;$$

$$\therefore y = 1 \text{ or } -3;$$

and by substitution in the second equation—

$$x = 9 \text{ or } -3.$$

### Geometry.

Finish revising the propositions included in the syllabus, and classify the theorems so as to know exactly which propositions may be used to prove any required sequence.

### Elementary Biology.

Owing to want of space, we have been obliged to allow our readers to study this from the text-books and our nature study columns. We now give a brief *résumé* of the principal points mentioned in the syllabus.

The chief difference between living and non-living bodies consists in this, that the former are capable of growing and of reproducing other bodies like themselves. The only case of growth in non-living bodies occurs in the formation of crystals from a saturated solution. There is, however, a very important difference, because a crystal increases in size by the addition of material to its outer surface, while a living body takes material into itself, and elaborates it so that it becomes part of itself, and thus the growth is really from within. Those substances, such as starch and fat, which were produced by living plants and animals were called "organic" substances, and it was believed that such substances could be produced by living plants and animals alone. In 1828, however, a German chemist, Wöhler, showed that urea might be prepared from inorganic materials. Later on it was shown that carbon and hydrogen can be made to unite directly, forming acetylene; and from this a whole series of substances, especially alcohols and acids, may be formed, which were formerly supposed to be producible by the "vital force" alone of animals and plants. This synthesis of organic bodies is not only of great theoretical importance as breaking down the barrier originally erected between organic and inorganic bodies, but is commercially important; for many substances formerly extracted from plants are now prepared quite cheaply from simpler bodies, such as the by-products of gas-works. Among substances that have thus been produced in such large quantities as to supersede the original method, we may mention such dye substances as madder and indigo, and such essences and flavourings as essence of pine-apple, used in flavouring sweets, etc.

A portion of living matter, or of matter which recently has been alive, will be found to consist of a mixture of several chemical compounds; and although it may have a definite shape, that shape is not a geometrical one, like a crystal. It will be found, moreover, to have a cellular or fibrous structure, and to be incapable of conversion into a liquid or gaseous state without decomposition into materials from which it can never be rebuilt by human agencies.

It may seem a very simple matter to distinguish an animal from a plant; and if the specimens were a cow and an oak tree, the differences would be evident enough. If you ask your class for the differences between animals and plants, you will probably be told that—

1. Animals can move and plants cannot.
2. Animals breathe out carbonic acid gas, and plants breathe out oxygen.
3. Many details will be mentioned that can easily be shown to be true of only a small section of animals or plants, such as that "animals are covered with hair."

(1) Some animals, however, cannot move from place to place—for example, oysters, sponges; while some of the very low plants have powers of locomotion, and some of the higher—for example, the sensitive plant *Mimosa pudica*—can move, although not from place to place.

(2) Plants are continually giving off carbonic acid gas, and it is only the green parts under the action of light that can liberate oxygen.

We must therefore look for more general differences; and here we find that although both are composed of very small segments called cells, the vegetable or plant cell has a covering of a material—cellulose—which differs from the matter of which the bulk of the cell is made. In fact, sometimes the covering of the cell is the only part that remains in an old cell. An animal cell, on the other hand, has no outer covering, although the part near the surface is generally harder than the rest. This difference is noticeable after death. During life it will be found that vegetable cells have the power of taking simple or "inorganic" substances and building up complex or "organic" substances, while animals take in organic or complex substances and give off simpler ones.

One of the simplest of animals is the amœba, or proteus animalcule. This is to be found in stagnant pools, and can be observed under a microscope. It will be found on close study—

1. To *feel* heat and moderate electric shocks, and to execute movements as the result.
2. To be capable also of *automatic* movements.
3. To undergo division, and so form two individuals from one. (Such creatures constitute a mathematical paradox, since they *multiply* by *division*.)
4. If crushed, the whole collapses, and shows no trace of any outer coat; even when stains are used, the whole substance stains evenly, showing it to be of the same material.

If we compare an amœba with one of the higher animals, we shall find that all the life functions are performed by the same cell, and are hence less efficiently performed. The same cell has to receive and appreciate all kinds of sensations, set up motion, move about, digest food, and breathe. As we examine creatures higher in the scale of animal life, we find that special parts of the body are entrusted with the performance of different functions, and are specially adapted by their structure for the work they are required to perform; such parts are called "organs." Thus in man there are organs of sense for receiving impressions of touch, sound, taste, sight, and smell; there are other organs—the nerves for conveying those impressions to the brain, an organ for receiving and appreciating those impressions, and also for liberating impulses for the production of motion. Then the muscles are organs which effect that motion by acting on the bones, etc.; and the work of digestion is carried out by a large collection of organs, each doing its own part of the business; while respiration is carried on in the lungs.

We have not space enough to deal further with plant life and animal life, but in addition to the text-books we recommended at the beginning of our course, we should advise our readers to go carefully through *Botany* and *Animal Physiology*, by V. T. Murché (Blackie), and Dr. Green's *Elementary Botany*, just published by T. Nelson and Sons.

Next month we shall give a complete set of questions covering the whole course as a preliminary test for the Certificate Examination in July.

# OUR SCIENCE SECTION

☞ **Subscribers requiring Explanations of Difficulties in any branch of Science, or Advice upon Courses of Study, can obtain all help required by communicating with the Editor, and accompanying their query with the Coupon cut from this Number.**

## PHYSIOGRAPHY.

### (ADVANCED AND HONOURS.)

**Further Sea Erosion.** — The advance of the sea on our coasts has always bulked largely in works on physical geology, possibly by reason of the fact that Britain illustrates very typically erosion of this kind. Examples of the disappearance of very large tracts of land are only too numerous. The case of the Kentish coast at the Reculvers, that of Eccles in Norfolk, that of the Yorkshire coast with vanished Hornsea Port, Ravensvodd, and many more, all testify to the success which attends the incessant warfare of the sea against the land. Much depends, of course, on the nature of the formations attacked. Chalk, gravels, and clay rapidly disappear, while the harder basalts and granites defy the waves successfully enough. A movement has been started in the direction of land salvage, which has for its aim the prevention of sea-attack on the Suffolk and Norfolk shores. The depredations there have been of a very severe character of late years.

**Electricity and Matter.**—Sir Oliver Lodge, Principal of the University of Birmingham, recently gave a lecture at Bedford College on "Electricity and Matter." A quarter of a century ago he would have said that electricity had a property resembling inertia. Now he would say, not only that electricity had real inertia just as real as matter, but that there is no inertia but electricity, and that the inertia of matter had to be explained electrically. In other words, what we were now arriving at gradually was the electrical theory of matter. We were endeavouring to explain the properties of matter in terms of and by means of what we know of electricity. Although it might sound a paradox to people who had not studied physics, more was known about electricity than about matter. This idea of electric inertia first took shape in a magnificent mathematical paper by J. J. Thompson of Cambridge, which, when it appeared in 1881, was simply regarded as a mere mathematical curiosity. He should also mention that Sir William Crookes had called attention to a phenomenon he had observed of matter in a fourth stage, which was neither solid, liquid, nor gaseous. Further research suggested the hypothesis, not yet by any means completely evolved, that all atoms of matter may be composed of these substances—corpuscles or electrons.

Passing rapidly through the various phenomena found along the line of his subject, Sir Oliver referred to the important developments made by M. and Mme. Curie in France. Having become familiar with the remarkable radiatory powers of uranium, they then discovered polonium, and later radium, which had the property possessed by uranium in a remarkable degree. The rays given off by this substance had marvellously penetrating powers, even more intense than the X-rays, and would blister the skin. They will penetrate not only aluminium or wood, but after passing through lead three inches thick are as strong as the rays from uranium. Sir Oliver Lodge finally endeavoured to give some conception of the size of electrons, the smallest bodies known, by asking his audience to conceive of the atom as being the size of a block 200 feet long, 80 feet broad, and 40 feet high, and the electron the size of a full stop.

**The Antarctic Expedition.**—On Feb. 3 the *Discovery* entered an inlet in the ice barrier in long. 174° W. A balloon was sent up, and a sledge party examined the land as far as lat. 78° 50′ S. Near Mounts Erebus and Terror, at the southern extremity of an island, excellent winter quarters were found. The expedition next observed the coast of Victoria Land, extending as far as a conspicuous cape in lat. 78° 50′. It was found that mountains do not exist here, and the statement that they were to be found is clearly a matter for explanation. Huts for living in and for making magnetic observations were erected, and the expedition prepared for wintering. The weather was boisterous, but a reconnaissance of sledge parties was sent out, during which the seaman Vince lost his life, the remainder of the party narrowly escaping a similar fate. The ship was frozen in on March 24. The expedition passed a comfortable winter in well-sheltered quarters. The lowest record temperature was 62° below zero. The sledging commenced on September 2, parties being sent out in all directions. Lieutenant Royds, Mr. Skelton, and party successfully established a record in an expedition to Mount Terror, travelling over the ice barrier under severe sleighing conditions with a temperature of 58° below zero. Commander Scott, Dr. Wilson, assistant surgeon, and Lieutenant Shackleton travelled ninety-four miles to the south, reaching land in lat. 80° 17′ south, long. 163° west, and establishing a world's record for the farthest point south.

The journey was accomplished in most trying conditions. The dogs all died, and the three men had to drag the sledges back to the ship. Lieutenant Shackleton almost died from exposure, but is now quite recovered. The party found that ranges of high mountains continue through Victoria Land at the meridian of 160°. Foot-hills much resembling the Admiralty Range were discovered. The ice barrier is presumably afloat; it continues horizontal, and is slowly fed from the land ice. Mountains 10,000 ft. or 12,000 ft. high were seen in lat. 82° south, the coast-line continuing at least as far as 83° 20′ nearly due south. A party ascending a glacier on the mainland found a new range of mountains with a height of 9,000 ft. A level plain was reached, unbroken to the west as far as the horizon.

The scientific work of the expedition includes a rich collection of marine fauna, of which a large proportion are new species. Sea and magnetic observations were taken, as well as seismographic records and pendulum observations. A large collection of skins and skeletons of southern seals and sea birds has been made; a number of excellent photographs have been taken, and careful meteorological observations were secured. Extensive quartz and grit accumulations were found horizontally banded in volcanic rocks, and lava flows were found in the frequently-recurring Plutonic rock which forms the basement of the mountains. Before the arrival of the *Morning*, the *Discovery* had experienced some privation, owing to part of the supplies having gone bad. This accounts for the death of all the dogs. She has, however, revictualled from the *Morning*, and the explorers are now in a position to spend a comfortable winter.

**A New Star in Gemini.**—The director of the Oxford University Observatory announces the discovery of what is believed to be a new star in the constellation Gemini. It was found on a photograph taken on March 16, confirmed by another photograph a week later, and announced to a few brother astronomers by post card on March 25. The star was seen and photographed at Cambridge, and the first glance at its spectrum, through a small direct-vision prism placed over the eye-piece, showed at once the "newness" of the star: its spectrum was full of bright lines, of which one in the green was the brightest. It was provisionally accepted as the line of unknown origin which is characteristic of nebulæ.

The star is not bright, being two magnitudes below naked-eye visibility, and it is probably fading rather quickly, for on March 16 it was rated as seventh magnitude, and on March 26 was about a magnitude fainter. And this faintness makes it impossible to decide at once whether it is actually a new star that has not appeared before, or whether it is a variable star which brightens up periodically and has escaped detection before, but has now been caught at a maximum. The latter is possible, for less than a degree away is a variable which rises from below the

eleventh to the eighth magnitude, and was found only a year or two ago.

**Sun Spots.**—As the period of sun-spot maximum, according to the eleven year period, is approaching, it is interesting to note that two large spots—one of abnormal size—have lately been observed.

**A Record Temperature for March.**—Recently the British Islands have been visited by a succession of the barometric depressions which have been prevalent for some weeks, and have occasioned a persistent continuance of mild south-westerly winds, with day and night temperatures considerably above the average. On Wednesday, March 25, the metropolis and southern parts of England experienced thunderstorms, and thunder and lightning occurred on succeeding days in various parts of the country. At Greenwich a temperature of 68° in the shade was recorded, which is the highest registered in March since 1894, and the reports issued by the Meteorological Office show that the temperature reached 65° at Oxford, 79° at Paris, and 81° at Biarritz. A peculiar feature of this abnormal temperature was that the highest readings occurred during the evening. A correspondent at Cambridge writes that he recorded 63° at 7.30 p.m. In the neighbourhood of London, a reading of 68° was recorded at 8 p.m. This temperature is about 27° above the average, and fully 5° above the average evening summer readings. The clouds bore a somewhat unusual appearance, known as *mammato-cumulus*, or festoon-clouds.

**The Earthquake in the Midlands.**—A few details referring to the earthquake in the midland counties on March 24 have reached us from correspondents. Mr. F. W. Shurlock says that at Derby a double shock occurred about 1.29 p.m., the two shocks being separated by a few seconds only, but no shock was felt at 1.10 p.m. At the Harris Institute, Preston, Mr. J. Harrison noticed a vibration of the building at about 1.32 p.m., and it was remarked that the suspended electric lamps were set swinging by the movement. Mr. W. French noticed a peculiar shaking of the floor of a room at Lancaster at about 1.30 p.m., and remarked that it was an earth tremor. A correspondent, writing from Rock Ferry, says there were three distinct shocks, the second being of a compound character. "There were about three principal movements in this middle shock, the first being most and the last least pronounced; but I could also distinguish in addition to this rolling a pitching motion at right angles to it, and a combination of the two, the greatest dip of the pitch being towards the north-east. Of the other two quakes, the first had one chief motion towards the south-east, and the last had one similar, but of less force, and then slight pitching, which gradually died away. There was no noise, and the time the earthquake lasted appears to me to be longer than that given in the accounts I have seen." Professor E. Wiechert records in the *Daily Mail* that the earthquake was registered by a seismograph at Gottingen.

# CHEMISTRY.

## (ADVANCED AND HONOURS.)

BY T. CARTWRIGHT, B.A., B.SC.

**New Method for the Direct Volumetric and Gravimetric Estimation of Mercury, Copper, and Zinc** (R. Cohn).—Mercuric thiocyanate, $(CyS)_2Hg$, is very slightly soluble in water, but is soluble in an excess of mercuric chloride or of an alkaline thiocyanate. In dilute solution, when acidulated with nitric acid, it does not colour ferric salts. We can estimate the mercury exactly in a solution of $HgCl_2$, for example, by adding first a little nitric acid and iron-alum, then a measured excess of a decinormal solution of $CySNH_4$; then we pour in a decinormal solution of nitrate of silver so as to pass the decoloration point, and then add more thiocyanate until the brown coloration reappears and remains for some minutes. In an analogous manner we can estimate copper or zinc volumetrically, as these metals form double mercuric thiocyanates, $(CyS)_2Hg.(CyS)_2M$. To the solution under examination we add a known quantity of a solution of $HgCl_2$ and of $CySNH_4$. But in these latter cases we can also proceed gravimetrically by collecting and roasting the precipitate of the double thiocyanate.

**Nitrates from the Air.**—It has been suggested that the method of extracting nitrates from the air electrically would dangerously exhaust the air of its nitrogen in the course of time, so that we should be fertilising the earth for plants at the expense of an important constituent of the air we breathe ourselves. Writing on this subject, a correspondent of the *Chemical News* observes: "The atmosphere covering a square mile of the earth's surface would furnish sufficient nitrogen for a ten years' supply of sodium nitrate at the rate of 12,000,000 tons of nitrates a year. To put it in another way: had the fixation of nitrogen from the atmosphere by electrical synthesis and absorption been begun some ninety years before the beginning of the Christian era, and been continued up to the present time, with the same annual output of 12,000,000 tons of sodium nitrate, the effect on the atmosphere as a whole would have been so slight as not to show itself by the ordinary methods of gas analysis. In fact, only a millionth of the available nitrogen would have been consumed.....Such a supposed deterioration of atmosphere, however, is founded on the assumption that nitrogen once fixed never finds its way back into the atmosphere.....The same general conclusions apply to oxygen. On the whole, therefore, the electrical process of producing nitrates is not likely to be a serious draft on the atmosphere."—*Illustrated Scientific News.*

**A Powerful Flame.**—The oxyhydrogen blowpipe is now quite out of date. Acetylene dissolved under pressure in acetone and fed with oxygen gives a jet of enormous calorific intensity. So great is the heat produced that it can be used for the autogenous welding of iron, and holes can be fused in iron plates. This should prove of the greatest use in many industries.

**Analytical Notes** (Edmund J. Mills, D.Sc., F.R.S.).—1. In the usual routine of qualitative separation, the filtrate, after passing hydric sulphide, is boiled and treated with nitric acid. If any iron be present, oxidation is imperfect, and some of the ferrous iron passes through the next group, to be precipitated by ammonic sulphide as "traces of nickel." For many years I have been in the habit of using bromine water, which is a perfect oxidiser, instead of nitric acid. It also has this advantage, that the desired excess of it can be readily detected by sight and smell.

2. The precipitate with ammonic sulphide is generally very difficult to filter, owing to the presence of some sulphur compound, presumably the pasty hydric persulphide. The remedy usually prescribed is prolonged boiling. I have always found the addition of a few grammes of sodic sulphite to the hot liquid (with precipitate) produce immediate clarification. As the metallic sulphides do not dissolve, this plan may be adopted for quantitative work.—*Chemical News.*

**Detection of Hydrogen Peroxide** (J. Aloy).—A soluble uranic salt, such as the nitrate, is treated with carbonate of potassium in sufficient quantity to dissolve the precipitate which is first formed. The addition of peroxide of hydrogen to this solution produces a beautiful red coloration. If we wish to detect traces of peroxide of hydrogen, it is better to operate in a different manner, and to make a solution of uranic nitrate in alcohol at 95°, and then add a few drops of the solution to be tested, and a few crystals of carbonate. In the presence of peroxide of hydrogen either a red precipitate or a red liquid is formed, which collects at the bottom of the vessel.

The reaction I have described takes place in two phases. In the first phase, the peroxide of hydrogen transforms the uranium compound into the white peruranic hydrate; in the second, this hydrate is decomposed by the alkaline carbonate.

**Equations set in Subject X., Science and Art Department (1897-1903).** (Reply to "A.C.")—1. $H_2S + SO_2 = 2H_2O + S_3$.

2. $H_2S + FeSO_4$ = no action, unless the hydrogen is removed by the addition of an alkali: thus—$FeSO_4 + 2KOH + H_2S = FeS + K_2SO_4 + 2H_2O$.

3. $(NH_4)_2S + FeSO_4 = FeS + (NH_4)_2SO_4$.

4. $(NH_4)_2S + CdCl_2 = CdS + 2NH_4Cl$.

5. $(NH_4)_2S + Na_2AsO_2$ = no precipitation unless an acid be added, when a yellow precipitate of $As_2S_3$ results; the solution, however, turns yellow. The equation for the reaction that results after the addition of an acid is—$2H_3AsO_3 + 3H_2S = As_2S_3 + 6H_2O$.

6. $3H_2SO_4 + Pb_3O_4 = 3PbSO_4 + 3H_2O + O$.

7. $5H_2SO_4 + 3H_2SO_3 + 2K_2CrO_4 = 2K_2SO_4 + Cr_2(SO_4)_3 + 3H_2SO_4 + 5H_2O$.

8. $2NaHO + K_2Cr_2O_7 = K_2CrO_4 + Na_2CrO_4 + H_2O$.

9. $2NaHO + Hg_2Cl_2 = Hg_2O + 2NaCl + H_2O$.

10. $K_2Mn_2O_8 + 13H_2SO_4 + 10FeCl_2 = K_2SO_4 + 2MnSO_4 + 5Fe_2(SO_4)_3 + 20HCl + 3H_2O$.

11. $H_2SO_3 + 3HCl + Na_2HAsO_4 = Na_2SO_4 + AsCl_3 + 3H_2O$.

**Radium.**—The properties of radium disclosed to the world by the French physicist, M. Curie, have already been made known to our readers. Radium is a recently discovered substance, so called because it emits "rays" which, when thrown on a sensitive screen of certain other substances, render the screen luminous. The nature of these "rays," which have been investigated by Sir William Crookes, is in itself sufficiently puzzling. A magnifying-glass shows the sensitive screen to become luminous under the impact of tiny particles. These

particles seem to be infinitely numerous. A minute quantity of radium salt will temporarily enable every vessel and object near it to render the screen luminous; and yet no diminution can be observed in the mass of the radiating body. M. Curie has passed from these light-producing properties of radium to discover in it a much more unique property of emitting heat. His experiments, described in the *Times* of March 25, showed that it continuously emitted heat for months without combustion or any kind of chemical change, or any change in its molecular structure. Radium maintained its own temperature, 2·7° F. above that of its surroundings. Half a pound of it would evolve per hour heat equal to that produced by burning a third of a cubic foot of hydrogen; and after doing this for indefinite periods, it was found not only molecularly unaltered, but without any apparent loss or exhaustion of this peculiar heat-producing power. An effect so considerable upon the world of matter and molecules was produced without any discoverable cause within that world—as if by a continuous act of spontaneous creation. The explanation given for the phenomena of light-production, that the minuteness of the emitted particles conceals their removal from the mass of radium, is incapable of accounting for the immensely greater generation of energy implied in the heat emission.

Radium apparently must absorb some form of ambient energy quite unknown to us, to whose action the ordinary substances of the molecular world are indifferent. This energy must be all about us; we cannot gauge its possible resources; yet we knew nothing of it till yesterday, and only know it now as transmuted by radium. The conception of different forms of energy, ambient and ubiquitous, separated, as it were, by water-tight compartments which only the freakish action of one rare substance is known to break down, is very different from that which dawned on the world when ordinary heat, light, and motion were first realised as easily-transmutable forms of one phenomenon. The prospects of knowing, measuring, exhausting the physical world perpetually recede as we advance. If only there were more radium in the world, we could keep the earth warm with it when the sun went out, remarks the *Manchester Guardian*.

**Preparation and Properties of Rubidium and Cæsium Hydrides** (Henri Moissan).—The author finds that rubidium and cæsium unite directly with hydrogen, giving crystalline compounds having formulæ RbH and CsH. These substances are very energetic reducing agents, decomposing water, hydrogen sulphide, and hydrochloric acid at ordinary temperatures. With sulphurous acid at a low temperature they give hydrosulphites; with carbonic acid, and by direct union of the formates with ammonia, amides are formed. These researches complete the author's proof that all the alkaline metals give with hydrogen definite binary compounds, which are crystalline, and have the formula RH.

# THEORETICAL MECHANICS.

## (ADVANCED AND HONOURS STAGES.)

BY FRANK CASTLE, M.I.M.E.,

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It will probably be advisable to utilise the short space of time before the examinations for thorough revision.

Obviously it is impossible to deal fully and effectively with all the various sections in these columns, but attention has from time to time been drawn to those parts which are of paramount importance. These should be carefully made out, and in addition it is necessary to obtain some practice in numerical exercise work.

*Fluid in Motion.*—Having considered a few of the more important portions of the subject dealing with fluids at rest, it now remains to refer somewhat briefly to some of the theorems and propositions dealing with fluid in motion. More detailed information than can be given here may easily be obtained from any text-book dealing with the subject.

*Law of Fluid Motion.*—What is sometimes referred to as the law of fluid motion may be expressed as follows:—When fluid weighing $w$ lbs. per cubic foot is in motion in a tube, then if at a point $h$ feet above a datum level the velocity is $v$ feet per second, and the pressure $p$ lbs. per square foot, it may be easily proved that—

$$h + \frac{v^2}{2g} + \frac{p}{w} = \text{constant} \quad . \quad . \quad . \quad . \quad . \quad (1)$$

The proof of this, although fairly easy, is too long for insertion, but it may be obtained from the sources named. The three terms in Eq. (1) are usually referred to as the *potential*, the *kinetic*, and the *pressure energy* of 1 lb. of water.

In many cases one of the terms is constant, and it is only necessary to consider the remaining two. Thus, in hydraulic machines, etc., the two latter terms only are important; whilst if the first and second terms only are considered, we obtain what is known as *Torricelli's Theorem*, which may be briefly stated as follows:—*From an aperture in an open vessel containing water, the particles of water will issue with a velocity the same as if they had fallen from the level of the surface to the level of the aperture.*

Thus if $h$ be the depth of the aperture or orifice below the surface, and $v$ the velocity of the issuing water in feet per second, then—

$$v = \sqrt{2gh} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

It should be noticed that this expression for $v$ involves only the constant $g$ (the acceleration due to gravity usually taken to be 32) and the depth $h$. Hence it follows that the velocity is independent of the position or inclination of the aperture. The quantity Q cubic feet per second which would flow from an aperture, area A, where A denotes the area in square feet, is given by—

$$Q = A\sqrt{2gh} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

As all resistances have been neglected, the quantity Q obtained from (3) is usually called the *theoretical outflow*. To obtain the *actual outflow*, it is necessary to multiply (3) by a constant $c$, where $c$ denotes a number whose value depends on the size and shape of the orifice, but is always less than unity; in other words, the actual outflow is always less than the theoretical. When the orifice is very small compared with $h$, the actual is approximately equal to the theoretical outflow.

*Vena-contracta.*—When the orifice is not very small compared with $h$, the stream contracts in breadth for some distance from the orifice. The place where the contraction ceases and the particles are all moving in parallel lines is called the *vena-contracta*. The effective area of the orifice will therefore, as already indicated, be the product $c \times A$. Hence, taking $g = 32$, Eq. (3) may be written—

$$Q = cA \times 8\sqrt{h} \quad . \quad . \quad . \quad . \quad . \quad . \quad (4)$$

Ex. 1. State and prove Torricelli's Theorem for the velocity of a jet of water issuing from a small hole in the side of a vessel. If the effective area of the hole is one-tenth of a square inch, and if 4 cubic feet of water issue from it per minute, find the head of water to which the velocity is due. (1902.)

$$\text{Here } Q = \frac{4}{60} = \frac{1}{15}; \; a = \frac{1}{10 \times 144} \text{ sq. ft.}$$

$$\therefore \frac{1}{15} = \frac{8}{10 \times 144}\sqrt{h};$$

$$\text{or } \sqrt{h} = \frac{10 \times 144}{8 \times 15} = 12.$$

$$\therefore h = 144 \text{ ft.}$$

Ex. 2. It is found that 1·5 cubic feet of water flow per minute through a vertical orifice in the side of a vessel, the head being constant at 6½ inches. If the orifice be circular and one square inch in cross section, find the diameter of the vena-contracta. (1900.)

$$\text{Here A} = \frac{1}{144} \text{ sq. ft.}; \; h = \frac{6\frac{1}{2}}{12} \text{ ft.} = \frac{13}{24} \text{ ft.},$$

$$\text{and Q} = 1{\cdot}5 \div 60.$$

Hence from (4) we obtain—

$$\frac{1{\cdot}5}{60} = c \times \frac{1}{144} \times 8\sqrt{\frac{13}{24}}.$$

$$\therefore c = \frac{1{\cdot}5 \times 144 \times \sqrt{24}}{60 \times 8 \times \sqrt{13}}$$

$$= 0{\cdot}6115.$$

$$\therefore \text{effective area} = 0{\cdot}6115 \text{ sq. in.}$$

$$\text{Diameter of vena-contracta} = \sqrt{\frac{0{\cdot}6115}{{\cdot}7854}}$$

$$= {\cdot}884 \text{ in.}$$

*Velocity of the descending Surface.*—If fluid is issuing from an orifice in a vessel, and no fluid enters, the free surface of the fluid will descend. Let $v$ denote the velocity of the issuing water, and $a$ the effective area of the orifice, V the velocity of the descending surface of the water, and $A_1$ the area of the section of the vessel.

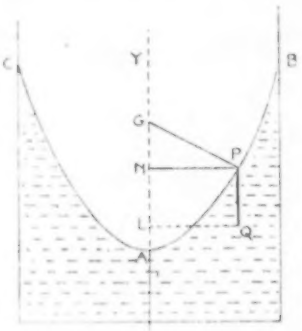
The height $h$ is variable, but if the orifice is small, $v$, and therefore V, may be assumed to be constant during a very small

interval of time denoted by $\delta t$. In the time $\delta t$ the volume which leaves the vessel is $va\delta t$, and in the same time the surface of the water falls a distance $V\delta t$.

$$\therefore v\delta t \times a = V\delta t \times A_1,$$

$$\text{or } V = \frac{av}{A_1} = \frac{a\sqrt{2gh}}{A_1}.$$

*Rotating Liquid.*—When an open vessel containing liquid is made to rotate about an axis AY, the surface assumes a hollow form BPAC.




Let P denote a particle of liquid of mass $m$ rotating with constant angular velocity $w$, then it is known that the force acting on P is the product of its mass $m$ and radial acceleration $w^2$PN.

The forces acting on P are—the force of gravity $mg$, and the liquid pressures equal in magnitude to $mw^2$PN, and in direction NP the resultant is the line PG.

The distance NG may be found from the relation

$$\text{NG} : \text{PN} = mg : mw^2\text{PN}.$$

$$\therefore \text{NG} = \frac{g}{w^2}.$$

Thus NG, the subnormal of the curve, is constant, and therefore the vertical section in the figure is a parabola. (The surface generated by the revolution of a parabola about its axis is a paraboloid.)

The latus rectum of a parabola is twice the subnormal, and is therefore $\frac{2g}{w^2}$. Also, from the known properties of a parabola,

$$\text{PN}^2 = \frac{2g}{w^2} \times \text{AN} \quad \ldots\ldots\ (1)$$

To obtain the pressure at any point Q in the liquid, assume a small prism having the point Q in its base. Then the weight of the prism is the pressure at Q. Therefore, if $p$ denote the pressure at Q, and $w$ the weight of unit volume,

$$p = w \times \text{PQ}.$$

It follows from the preceding that if an open cylinder be made to rotate, the quantity of water that will be spilt will be the volume of the concave portion CPAB. The amount can be obtained from the known result that *the volume of a paraboloid is half the volume of a cylinder on the same base and the same height*. Thus, if the velocity is such that the vertex A is in contact with the base of the cylinder, then half the liquid will be spilt.

Ex. 3. A vessel and the liquid contained in it rotate uniformly about a vertical axis; find the pressure at any point of the rotating liquid. If the liquid be a circular cylinder of radius $r$ and height $h$, and be full of water, show that half the liquid will be spilt if the angular velocity be equal to $\frac{1}{r}\sqrt{(2gh)}$. (1901.)

It is obvious that half the liquid will be spilt when the vertex A of the paraboloid just touches the base of the cylinder. When this occurs AN $= h$, and PN $= r$. Hence from (1)

$$r^2 = \frac{2g}{w^2} \times h.$$

$$\therefore w = \frac{1}{r}\sqrt{2gh}.$$

Ex. 4. The radius of a cylinder is one foot, and it turns three times a second. Find the pressure per square inch at a point six inches below the lowest point of the surface of the water. (1893.)

Ans. 6803·6 grains.

Ex. 5. A cylindrical vessel, radius $r$ and height $h$, is half full of water. Find the velocity when the water just rises to the rim of the vessel. (1894.)

Ans. $w = \frac{1}{r}\sqrt{2gh}$.

Ex. 6. When a vessel turns uniformly about a vertical axis, and the liquid in the vessel also turns uniformly (as if it were rigid), find the pressure at any point within the liquid.

In the case of a spherical vessel full of water turning about its vertical diameter, which is four feet long, find the pressure per square inch at the centre of the sphere and at the end of a horizontal radius, when the vessel turns 120 times a minute. (*N.B.* $\pi^2 = 9{\cdot}87$.) (1902.)

Ex. 7. A long, thin cylinder is filled with water and closed. It is made to rotate steadily about a diameter of one end. Putting gravity out of the question, find the pressure of the water on the other end.

If the cylinder is five feet long, and has a cross section of a square inch, find the pressure when it makes 90 turns a minute ($\pi^2 = 10$). (1897.)

Ex. 8. A cylinder is filled with water and closed. It is then made to turn with a given angular velocity about its axis, which is vertical. Find the pressure per unit area at any assigned point within the water. (1899.)

Ex. 9. A vessel of water nine feet high is kept constantly full of water. A hole, whose area is a quarter of a square inch, is made in its bottom. What would be the theoretical outflow in one hour? How would the actual outflow differ from the theoretical outflow? (1893.)

Ans. 150 cubic feet.

Ex. 10. A cylindrical vessel is ten feet high, and its base, which is horizontal, has a radius of one foot. It is filled with water, and a small hole is made in the bottom. Compare the rate of descent of the surface when the hole is first opened with the rate when the vessel is half empty. If the vessel is half emptied in twenty minutes, what is the effective area of the hole? (1892.)

Ans. $\sqrt{2} : 1$; 0·087 sq. in.

Ex. 11. Find the velocity of the descending surface when a cylinder containing water is being emptied by a small hole.

If the radius of the cylinder is two feet, and the surface of the water is ten feet above the hole, and the effective radius of the hole is a quarter of an inch, find the velocity with which the surface of the water is falling. Find also the time in which it would fall five feet. (1897.)

# ELECTRICITY AND MAGNETISM.

## (ADVANCED AND HONOURS STAGES.)

BY EDWIN EDSER, A.R.C.S., F.PH.S.

THE following problems may assist the student to obtain clearer ideas on the subjects previously dealt with:—

1. How can the speed of a motor be varied?

A motor runs at such a speed that its armature conductors, cutting the lines of force in the air gap, generate a back E.M.F. equal to the impressed P.D. maintained between the brushes of the machine. Let B be the number of lines of force per sq. cm. in the air gap, while N is the number of conductors simultaneously beneath a pole, each conductor being $l$ centimetres long, and extending at right angles to the field in the air gap. Then, if $v$ is the velocity of a conductor at right angles to the field, the E.M.F. generated by it will be equal to B$lv$, and the total back E.M.F. generated will be equal to NB$lv$. But if the radius of the armature is equal to $r$, and the speed is equal to $n$ turns per minute,

$$v = 2\pi r \cdot \frac{n}{60}.$$

$$\therefore \text{back E.M.F.} = \text{NB}l \times \frac{2\pi rn}{60}$$

$$= \frac{2\pi n}{60} \cdot \text{NB}lr.$$

Let V = the impressed P.D. maintained between the brushes, and therefore between the extremities of the armature circuit.

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If the machine is running light, no appreciable torque will be required in order to keep the armature rotating, so that the current in the armature will be negligible, and there will be no drop within the armature. Then

$$V = \frac{2\pi n N B l r}{60},$$

$$n = \frac{60V}{2\pi N B l r}.$$

Now N, $l$, and $r$ are constant for a given machine, since they represent constructional dimensions. Hence, to vary $n$, the speed of the motor, we must alter V or B. An increase of V will increase the speed, and a decrease of V will decrease it, provided that B remains constant. An increase of B will decrease the speed, and a decrease of B will increase it, provided that V remains constant.

The readiest method of varying the speed of a motor is to alter the value of B, the field in the air gap, by altering the magnetising current of the field magnet system. If the motor is shunt wound, the full P.D. of the mains will be maintained between the terminals of the magnet circuit; if we insert an adjustable resistance in series with the magnet windings, then increasing the value of this resistance will decrease the value of B, and therefore increase $n$. Conversely, decreasing the resistance switched into the magnet circuit will increase B, and decrease $n$.

If the motor is series wound, the readiest method of varying the magnetising current is to switch a regulating resistance *in parallel* with the field windings, so as to divert part of the current from flowing round the field magnets. The more this by-pass resistance is diminished, the smaller will be the magnetising current, and therefore the greater will be the speed of the motor. The regulating resistance should be so adjusted that when the shunt circuit is broken, the motor runs at the lowest speed required.

It is not so easy, when a motor is running light, to effectively adjust its speed by varying V, at any rate when the motor is shunt wound. For if we assume that B is proportional to the magnetising current (which is sometimes, but not always, approximately the case), an alteration of the terminal voltage of the machine will simultaneously increase or decrease both V and B in the same proportion. An adjustable resistance may, however, be inserted in the armature circuit: this arrangement is chiefly used for starting shunt-wound motors.

2. A shunt-wound dynamo is being used to charge accumulators, when the belt slips off the driving pulley. It is observed that the machine continues to run at the same speed and in the same direction as previously, without showing any signs of pulling up. Explain this.

Each of the cells which is being charged exerts a back E.M.F. equal to about 2·5 volts, so that if N cells are being charged in series, the total back E.M.F. in the circuit will amount to $2{\cdot}5 \times N$ volts.

The positive brush of the dynamo—that is, the brush by which the current *leaves* the armature—will be connected to the positive terminal of the battery cells. One terminal of the magnet winding will be connected to the positive brush, and the other to the negative brush of the dynamo, and the magnetising current will, of course, flow round the magnets from the + to the − brush. The torque acting on the armature will oppose the rotation of the latter, according to Lenz's law, which states that *when a system of conductors is moved in a magnetic field, the induced currents will be directed so that their mechanical actions tend to stop the motion of the conductors.* Further, we know that the torque is proportional to the product of B and C, where B is the field in the air gap and C is the current in the conductors. Thus, if we reverse either B or C—that is, change the direction, and so change the sign, of either of these quantities—we shall change the sign, and therefore the direction, of the torque; if both quantities are simultaneously reversed, the sign of the torque remains unchanged. Now, when the belt slips off the pulley of the dynamo, energy can no longer be generated by the latter, and the direct E.M.F. is no longer produced. The cells, however, still possess an E.M.F., and this will send a current through the armature from the positive to the negative brush—that is, in the reverse direction to that in which the current was previously flowing. Thus C is reversed. The current in the field coils will, however, be in the same direction as before, since it will still flow round the magnets in the direction from the + to the − brush, so that the sign of B will remain unchanged. Consequently, the direction of the torque acting on the armature is reversed; and since the torque originally opposed the motion of the armature, it will now keep the armature rotating in the original direction. In a word, the machine continues to rotate as a motor, absorbing energy from the secondary cells.

3. A given motor is required to rotate in a certain direction. Does it matter which terminal of the machine is connected to the positive main? If, on connecting the machine up, it is found to rotate in a direction contrary to that required, how would you proceed in order to reverse the direction of its motion?

The direction of rotation of the armature will depend on the direction of the torque acting on it, and the sign of the torque is determined by the sign of BC. If a particular terminal of the machine is connected to the positive main, the current will flow through the machine from that to the other terminal. If the machine is shunt wound, the current will divide itself, inside the machine, into two branches, one flowing through the armature, and the other through the field circuit. If we had connected the other terminal to the positive main, the current in each of these circuits would have been reversed, so that the sign of the product BC would have been unaffected. Thus the machine rotates in the same direction whichever terminal is connected to the positive main.

In the case of a series-wound motor, the same law applies. In this case the current flows in a single stream through the machine, first, let us say, circulating round the field coils, and then through the armature. Reversing the connections to the mains reverses both the armature and the field currents, so that the sign of the torque is unchanged, and the direction of rotation of the armature is unaffected.

If we wish to reverse the direction of rotation of a motor, we must reverse the direction of the current in the armature *or* in the field circuit, but not in both.

4. A shunt-wound dynamo, when driven at its proper speed, is found to have the wrong polarity—that is, the brush which should be positive is negative. How would you set this right?

The sign of the E.M.F. generated is determined by the sign of the product $Bv$; therefore reversing only the polarity of the field magnets, *or* reversing only the direction of rotation, will have the desired effect. For reasons to be explained later, altering the direction of rotation will not alone suffice; on the other hand, the sign of B can be easily changed. The initial E.M.F. generated will depend on the residual magnetism of the field magnets; hence, while the brushes are raised, so that no current flows through the armature, we must send a small current, from a few Daniell cells, round the field magnets, in such a direction as to reverse the polarity of the latter. On lowering the brushes, the machine will generally be found to excite itself, in which case the brushes will be found to have the correct signs.

5. Before a shunt-wound dynamo is coupled up to the driving engine, it is found, by the aid of a compass needle, that the field magnets retain a sufficient amount of residual magnetism. On setting the armature in rotation, the dynamo fails to excite itself, and it is found that the residual magnetism of the magnets has vanished. Explain this, and state how the dynamo could be caused to excite itself.

If there is any field in the air gap when the armature is set in rotation, a certain E.M.F. will be generated by the latter, which will render one brush positive, the other negative. A current will flow round the field magnets, from the + to the − brush; for the machine to excite itself, the direction of circulation of this current must be such that it tends to *increase the magnetisation* of the field magnets. The fact that excitation is not produced shows that the direction of the field current is such that it tends to reverse the magnetisation of the field magnets; as the magnetisation falls, the E.M.F. generated will diminish, so that no E.M.F. will be generated when the magnets are just demagnetised, and therefore the dynamo ceases to act.

To remedy this state of affairs, it is useless to temporarily magnetise the field magnets in a reverse direction, for in this case B, and with it the E.M.F. generated, will be reversed; thus the current in the field circuit is reversed, and since the magnetisation of the magnets is also reversed, the current will again demagnetise the field magnets. The only way to proceed is either to drive the armature in the opposite direction to that at first adopted, or, if this is impracticable or inconvenient, to connect each end of the field circuit to the brush opposite to that to which it was originally joined. After temporarily magnetising the magnets, the dynamo will then excite itself.

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*Cue.*—Three equal billiard balls, whose size may be neglected, are placed at the points A, B, C. Show that it is not possible for A to cannon off B on to C unless the angle ABC is greater than the obtuse angle whose sine is $\frac{1+e}{3-e}$, where $e$ is the coefficient of restitution. (Cambridge Entrance, 1890.)

Let BX be the direction of the line joining the centres of A and B at the instant of impact, and suppose A had been moving in the direction AB with uniform velocity V. Draw BY at right angles to BX. Resolve the velocity V into V cos $\theta$ along BX, and V sin $\theta$ along BY, where $\theta$ denotes the angle between BX and AB produced. Then, since the masses of the balls are equal, from the fundamental formulæ we have—

$$v' - v = eV\cos\theta.$$
$$v' + v = V\cos\theta.$$
$$\therefore v = \frac{1-e}{2}V\cos\theta.$$

Hence the ball originally at A has, after impact with the ball placed at B, a velocity along BX equal to $\frac{1-e}{2}V\cos\theta$, and a velocity along BY equal to V sin $\theta$.

Let BC represent in magnitude and direction the resultant of these two velocities. Then, if CN is drawn perpendicular to BY, we have—

$$\tan CBN = \frac{CN}{NB} = \frac{\frac{1-e}{2}V\cos\theta}{V\sin\theta} = \frac{1-e}{2}\cot\theta.$$

Denoting the angle CBN by $\alpha$, and the angle between CB and AB produced by $\beta$, we have—

$$\beta = \frac{\pi}{2} - (\theta + \alpha).$$

$$\therefore \cot\beta = \tan(\theta+\alpha) = \frac{\tan\theta + \tan\alpha}{1 - \tan\theta\,.\,\tan\alpha}.$$

$$\therefore \cot\beta = \frac{\tan\theta + \frac{1-e}{2}\,.\,\frac{1}{\tan\theta}}{1 - \tan\theta\,\frac{1-e}{2}\,.\,\frac{1}{\tan\theta}}.$$

$$\therefore \cot\beta = \frac{2\tan^2\theta + 1 - e}{\{2-(1-e)\}\tan\theta}.$$

Denoting $\cot\beta$ by $y$, and $\tan\theta$ by $x$, we have—

$$y = \frac{2x^2 + 1 - e}{(1+e)x}.$$
$$\therefore 2x^2 - y(1+e)x + 1 - e = 0.$$
$$\therefore x = \frac{y(1+e) \pm \sqrt{y^2(1+e)^2 - 8(1-e)}}{4}.$$

Hence, for real values of $x$, $y^2 \not< \frac{8(1-e)}{(1+e)^2}$.

$$\therefore 1 + y^2 \not< \frac{8(1-e)}{(1+e)^2} + 1.$$
$$\therefore 1 + y^2 \not< \left(\frac{3-e}{1+e}\right)^2.$$
$$\therefore 1 + \cot^2\beta \not< \left(\frac{3-e}{1+e}\right)^2.$$
$$\frac{1}{\sin^2\beta} \not< \left(\frac{3-e}{1+e}\right)^2.$$
$$\therefore \sin\beta \not> \frac{1+e}{3-e}.$$

Hence the angle ABC must be greater than the obtuse angle whose sine is $\frac{1+e}{3-e}$.

*Puzzled.*—Find a value of sin $x$ which satisfies the equation

$$\frac{\sqrt{3}-1}{2\sqrt{3}} = \frac{\sin x\sqrt{3} - \sqrt{1-\sin^2 x}}{2}.$$

Multiplying both sides by $2\sqrt{3}$, we have—

$$\sqrt{6}\sin x - \sqrt{2 - 2\sin^2 x} = \sqrt{3} - 1.$$
$$\therefore \sqrt{6}\sin x + 1 - \sqrt{3} = \sqrt{2 - 2\sin^2 x}.$$

Squaring, we have—

$$6\sin^2 x + 2(1-\sqrt{3})\sqrt{6}\sin x + 4 - 2\sqrt{3} = 2 - 2\sin^2 x.$$
$$\therefore 8\sin^2 x + 2(1-\sqrt{3})\sqrt{6}\sin x + 2(1-\sqrt{3}) = 0.$$

Solving this quadratic equation for sin $x$, we have—

$$\sin x = \frac{\sqrt{6}(\sqrt{3}-1) \pm \sqrt{\{6(\sqrt{3}-1)^2 - 16(1-\sqrt{3})\}}}{8}$$
$$= \frac{\sqrt{6}(\sqrt{3}-1) \pm \sqrt{\{6(4-2\sqrt{3}) - 16(1-\sqrt{3})\}}}{8}$$
$$= \frac{3\sqrt{2} - \sqrt{6} \pm \sqrt{\{8+4\sqrt{3}\}}}{8}$$
$$= \frac{3\sqrt{2} - \sqrt{6} \pm 2\sqrt{(2+\sqrt{3})}}{8}$$

Now let $\sqrt{2+\sqrt{3}} = \sqrt{p} + \sqrt{q}$.

$$\therefore 2 + \sqrt{3} = p + q + 2\sqrt{pq}.$$
$$\therefore p + q = 2, \text{ and } 2\sqrt{pq} = \sqrt{3}.$$
$$\therefore (p+q)^2 = 4, \text{ and } 4pq = 3.$$
$$\therefore p - q = 1.$$

Hence $p = \frac{3}{2}$, and $q = \frac{1}{2}$.

$$\therefore \sqrt{2+\sqrt{3}} = \frac{\sqrt{3}}{\sqrt{2}} + \frac{1}{\sqrt{2}} = \frac{\sqrt{6}+\sqrt{2}}{2}.$$
$$\therefore \sin x = \frac{3\sqrt{2} - \sqrt{6} \pm 2\,\frac{\sqrt{6}+\sqrt{2}}{2}}{8}$$
$$= \frac{3\sqrt{2} - \sqrt{6} \pm (\sqrt{6}+\sqrt{2})}{8}$$

Taking the upper value of the double sign, this gives—

$$\sin x = \frac{4\sqrt{2}}{8} = \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}}.$$

The lower value of the double sign gives—

$$\sin x = \frac{2\sqrt{2} - 2\sqrt{6}}{8} = \frac{\sqrt{2} - \sqrt{6}}{4}.$$

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that is, £45981·25.

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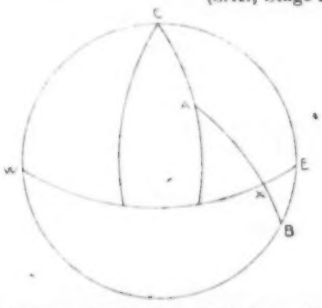
*Arum.*—There are two stations, the one in latitude 45° N. and longitude 30° E., the other in latitude 23° 12′ S. and longitude 90° E. Find the longitude of the point in which the great circle joining the stations cuts the equator.

(S.K., Stage III., 1892.)




Let A be the station in latjtude 45° N. and longitude 30° E., B the station in latitude 23° 12′ S. and longitude 90° E., and let X be the point in which the great circle joining AB cuts the equator WE. Then, if C be the North Pole, we have CA = 45°, CB = 113° 12′, and ACB = 60°.

From the triangle ACB we have

$$\tan \tfrac{1}{2}(A + B) = \frac{\cos \frac{1}{2}(a - b)}{\cos \frac{1}{2}(a + b)} \operatorname{cotan} \tfrac{1}{2}C$$

$$= \frac{\cos \frac{1}{2}(113° 12′ - 45°)}{\cos \frac{1}{2}(113° 12′ + 45°)} \operatorname{cotan} 30°$$

$$= \frac{\cos 34° 6′}{\cos 79° 6′} \operatorname{cotan} 30°.$$

log cos 34° 6′ = $\bar{1}$·9180620
log cot 30° 0′ = 0·2385606
0·1566226
log cos 79° 6′ = $\bar{1}$·2766811
∴ log tan ½(A + B) = 0·8799415
log tan 82° 29′ = 0·8795957
3458
60
9752)207480(21·3
19504
12440
9752
2688

∴ ½(A + B) = 82° 29′ 21″·3.

Again, $\tan \frac{1}{2}(A - B) = \frac{\sin \frac{1}{2}(a - b)}{\sin \frac{1}{2}(a + b)} \operatorname{cotan} \frac{C}{2}$

$$= \frac{\sin 34° 6′}{\sin 79° 6′} \cot 30°.$$

log sin 34° 6′ = $\bar{1}$·7486833
log cot 30° = 0·2385606
$\bar{1}$·9872439
log sin 79° 6′ = $\bar{1}$·9920932
∴ log tan ½(A − B) = $\bar{1}$·9951507
log tan 44° 40′ = $\bar{1}$·9949466
2041
60
2527)122460(48·4
10108
21380
20216
1164

∴ ½(A − B) = 44° 40′ 48″·4.
½(A + B) = 82° 29′ 21″·3.
∴ B = 37° 48′ 33″.

Then from the triangle XEB we have

tan XE = sin BE . tan XBE.
∴ tan XE = sin 23° 12′ . tan 37° 48′ 33″.

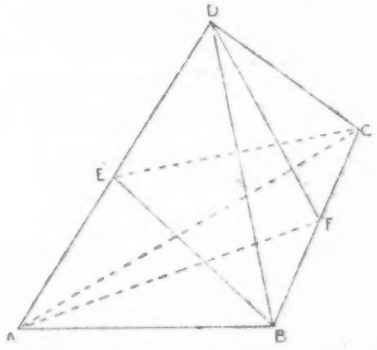
log sin 23° 12′ = $\bar{1}$·5954322
log tan 37° 48′ 33″ = $\bar{1}$·8898258
$\bar{1}$·4852580
log tan 16° 59′ = $\bar{1}$·4848870
3710
60
4520)222600(49·2
18080
4180
4068
112

∴ XE = 16° 59′ 49″.

Hence the longitude of the point X is 73° 0′ 11″ east.

*Carrett.*—ABCD is a tetrahedron. Show that if the straight lines bisecting the plane angles ABD, ACD intersect, the straight lines bisecting the plane angles BAC, BDC will also intersect.

(Cambridge Senior, December 1898.)




Let BE, CE, the bisectors of the plane angles ABD, ACD, intersect in E. Let AF, the bisector of the plane angle BAC, cut BC in F. Join FD. We have to prove that FD bisects the plane angle BDC.

Because in the triangle ADB the line BE bisects the angle DBA, therefore

BA : BD :: AE : ED. . . . . (i)

Again, because CE bisects the angle DCA,

∴ AE : ED :: AC : CD. . . (ii) (Euclid, VI. 3).

Therefore from (i) and (ii) we have

BA : BD :: AC : CD.
∴ BA : AC :: BD : DC.

But AF bisects the plane angle BAC (construction).

∴ BF : FC :: BA : AC.

Hence BD : DC :: BF : FC.

Therefore DF bisects the plane angle BDC.

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*Esk.*—A focal chord of a parabola is drawn inclined at 45° to the axis of the curve. If the arc thus cut off revolve about the chord, find the volume bounded by the surface generated.
(S.K. Mathematics, Stage 6, 1895.)

The equation of the parabola referred to the axis and the tangent at the vertex is

$$y^2 = 4ax, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (i)$$

where $4a$ is the parameter.

Transforming to parallel axes through the focus, (i) becomes

$$y^2 = 4a(x + a). \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (ii)$$

Again transforming to the given focal chord as axis of $x$, and the perpendicular to this chord at the focus as axis of $y$, the equation (ii) becomes

$$\left(\frac{y+x}{\sqrt{2}}\right)^2 = 4a\left(\frac{x-y}{\sqrt{2}} + a\right),$$

and this on reduction becomes

$$y^2 + 2(x + 2\sqrt{2}a)y + x^2 - 4\sqrt{2}ax - 8a^2 = 0. \quad . \quad . \quad (iii)$$

Solving (iii) for $y$, we have

$$y = -(x + 2\sqrt{2}a) \pm 2\sqrt{(2\sqrt{2}ax + 4a^2)};$$

and here the upper sign must be taken, since, for the arc cut off, $y$ must be positive when $x = 0$. Hence

$$y^2 = x^2 + 12\sqrt{2}ax + 24a^2 - 4(x + 2\sqrt{2})\sqrt{2\sqrt{2}ax + 4a^2}.$$

Now putting $y = 0$ in (iii), we have $x^2 - 4\sqrt{2}ax - 8a^2 = 0$, and this determines the points in which the new axis of $x$ (that is, the given focal chord) cuts the curve. These points are therefore given by $x = 2(\sqrt{2} \pm 2)a$, $y = 0$.

It only remains then to evaluate the integral

$$\pi\int y^2 dx \text{ between the limits } x = 2(\sqrt{2} \pm 2)a.$$

We have therefore to evaluate

$$\pi \int_{2(\sqrt{2}-2)a}^{2(\sqrt{2}+2)a} [x^2 + 12\sqrt{2}ax + 24a^2 - 4(x + 2\sqrt{2}a)\sqrt{2\sqrt{2}ax + 4a^2}]dx,$$

$$\text{or } \pi \int_{2(\sqrt{2}-2)a}^{2(\sqrt{2}+2)a} [x^2 + 12\sqrt{2}ax + 24a^2]dx$$

$$- 4\pi \int_{2(\sqrt{2}-2)a}^{2(\sqrt{2}+2)a} [(x + 2\sqrt{2}a)\sqrt{2\sqrt{2}ax + 4a^2}]dx.$$

In the second integral, let $2\sqrt{2}ax + 4a^2 = z^2$.

Then $x + \sqrt{2}a = \frac{z^2}{2\sqrt{2}a}$. $\quad \therefore x + 2\sqrt{2}a = \frac{z^2 + 4a^2}{2\sqrt{2}a}$.

$$\text{Also } dx = \frac{z}{\sqrt{2}a}dz.$$

Again, when $x = 2(\sqrt{2} \pm 2)a$, $z = 2(\sqrt{2} \pm 1)a$.

Hence we have to evaluate

$$\pi \int_{2(\sqrt{2}-2)a}^{2(\sqrt{2}+2)a} [x^2 + 12\sqrt{2}ax + 24a^2]dx$$

$$- 4\pi \int_{2(\sqrt{2}-1)a}^{2(\sqrt{2}+1)a} \left[\frac{z^2 + 4a^2}{2\sqrt{2}a} \cdot z \cdot \frac{z}{\sqrt{2}a}\right]dz,$$

$$\text{or } \pi \left[\frac{x^3}{3} + 6\sqrt{2}ax^2 + 24a^2x\right]_{2(\sqrt{2}-2)a}^{2(\sqrt{2}+2)a}$$

$$- \frac{4\pi}{4a^2}\left[\frac{z^5}{5} + \frac{4a^2z^3}{3}\right]_{2(\sqrt{2}-1)a}^{2(\sqrt{2}+1)a}$$

$$= \pi\{106\cdot\dot{6} + 384 + 192 - 524\cdot8 - 149\cdot\dot{3}\}a^3$$

$$= \underline{8\cdot5\dot{3}\pi a^3}.$$

*J. D. Sayle.*—You appear to misunderstand the question. The answer given in the book is correct, and may be obtained as follows:—

The first stone reaches a height of 400 feet, and therefore, when it is 20 feet above the surface, it must have fallen through a distance of 380 feet, and its velocity at the instant, found from $v^2 = 2gs$, is $v^2 = 64 \times 380$.

$\therefore v = 8\sqrt{380}$ feet per sec.

Let $s$ be distance below the starting-point at which they meet.

Then a stone started from rest will describe a distance $s$ in a time $t$ obtained from

$$s = \tfrac{1}{2}gt^2 = 16t^2. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

In the same time $t$ the first stone has to move through a distance $20 + s$ feet, and as its initial velocity is $8\sqrt{380}$ feet per sec., we obtain from the equation $s = Vt + \frac{1}{2}gt^2$ by substitution

$$20 + s = 8\sqrt{380}t + 16t^2. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

We can eliminate $s$ by substituting its value from (1) in (2).

$$\therefore 20 + 16t^2 = 8\sqrt{380}t + 16t^2,$$

$$\text{or } t = \frac{20}{8\sqrt{380}}.$$

This is the time required for the two stones to meet. The space described may be obtained by substituting this value of $t$ in (1).

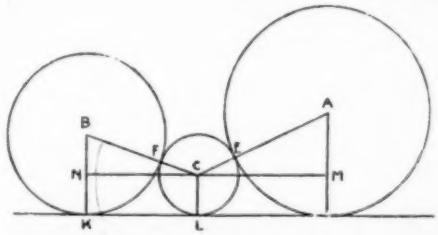
$$\therefore s = 16 \times \frac{400}{64 \times \sqrt{380}} = \tfrac{1}{\sqrt{19}} = \tfrac{\sqrt{19}}{19} \text{ feet.}$$

Hence the two stones will meet at a distance $\frac{\sqrt{19}}{19}$ feet from the point of projection.

*Caliga.*—Two spheres of radii $a$ and $b$ are at rest on a horizontal table, the distance between the points of contact with the table being $d$. Show that the largest sphere that can be rolled between them has a radius $\rho = \frac{1}{4}\frac{d^2}{(\sqrt{a} + \sqrt{b})^2}$, and hence show that if the two former spheres touch,

$$\frac{1}{\sqrt{\rho}} = \frac{1}{\sqrt{a}} + \frac{1}{\sqrt{b}}.$$

(Inter. Science, London, 1901.)




Let K and H be the points of contact with the table of the spheres whose centres are respectively at B and A. Let C be the centre of a sphere which will just pass between the other two, and let B, A, and C be in the vertical plane through K and H. Join CB, CA. Then E, F, the points of contact of the third sphere with the first two, lie in CB, CA. Through C draw the horizontal line NCM, cutting the verticals BK, AH in N, M. Let L be the point of contact of the third sphere with the table. We have then

$$KL^2 = NC^2 = BC^2 - BN^2.$$

$$\therefore KL^2 = (b + \rho)^2 - (b - \rho)^2 = 4b\rho.$$

$$\therefore KL = 2\sqrt{b\rho}.$$

$$\text{Similarly, } LH = 2\sqrt{a\rho}.$$

$$\therefore d = 2\sqrt{a\rho} + 2\sqrt{b\rho} = 2\sqrt{\rho}(\sqrt{a} + \sqrt{b}).$$

$$\therefore \rho = \frac{d^2}{4(\sqrt{a} + \sqrt{b})^2}.$$

When the first two spheres touch,

$$d^2 = (a + b)^2 - (a - b)^2 = 4ab.$$

$$\text{Then } \rho = \frac{4ab}{4(\sqrt{a} + \sqrt{b})^2}. \quad \therefore \frac{1}{\sqrt{\rho}} = \frac{\sqrt{a} + \sqrt{b}}{\sqrt{ab}} = \frac{1}{\sqrt{a}} + \frac{1}{\sqrt{b}}.$$

*Q.E.D.*

*Bike.*—A straight line of constant length slides between two straight lines at right angles to each other—namely, C$A\alpha$, C$b$B. AB and $ab$ are two positions of the movable straight line, and P is their point of intersection. Show that in the limit, when the positions coincide, we have

$$\frac{A\alpha}{Bb} = \frac{CB}{CA}, \text{ and } \frac{PA}{PB} = \left(\frac{CB}{CA}\right)^2.$$

(Edwards's *Differential Calculus.*)

Let CA $= x$, and A$\alpha = dx$.

CB $= y$, and B$b = dy$.

The length $dx$ will be positive or negative, according as $\alpha$ is farther from or nearer to C than A. The sign of $dy$ is determined in a similar manner. When $dx$ is positive, $dy$ will be negative, and *vice versâ*.

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$$(AB)^2 = (ab)^2.$$
$$x^2 + y^2 = (x + dx)^2 + (y + dy)^2.$$
$$x^2 + y^2 = x^2 + 2xdx + (dx) + y^2 + 2ydy + (dy)^2.$$

Neglecting the values of $(dx)^2$ and $(dy)^2$ in comparison with the remaining terms, we have

$$2xdx + 2ydy = 0.$$
$$\therefore \frac{dx}{dy} = -\frac{y}{x}, \text{ or } \frac{Aa}{Bb} = -\frac{CB}{CA}.$$

From P as centre, with PA as radius, describe the circular arc Ac. With the same centre, and PB as radius, describe the circular arc B*d*, cutting P*b* produced in *d*. Then, since the angles APa and BP*b* are equal, we must have

$$\frac{Ac}{PA} = \frac{Bd}{PB}.$$

Treating the short circular arc Ac as a straight line, we have

$$Ac = Aa \cos aAc = Aa \sin BAC = dx \cdot \frac{y}{AB},$$

since $\angle PAc = \frac{\pi}{2}$.

Similarly, $Bd = Bb \cos bBd = Bb \sin ABC = dy \frac{x}{AB}$.

$$\text{Then } \frac{ydx}{AB \cdot PA} = \frac{xdy}{AB \cdot PB}.$$
$$\therefore \frac{PA}{PB} = \frac{ydx}{xdy} = -\frac{y^2}{x^2} = -\left(\frac{CB}{CA}\right)^2.$$

*Garn.*—The moment of a magnet is 1,000 in C.G.S. units. How much work is done in turning it through 90° from the magnetic meridian in a horizontal plane at a place where the horizontal intensity of the earth's field is 0·16 C.G.S. units?

(Inter. Science, 1902.)

Let us suppose that the magnet is initially placed in the magnetic meridian, its N pole pointing to the north, and that the rotation is accomplished in a clock-wise direction. Then, when the magnet has been turned through 90° in a horizontal plane, the N pole will have arrived at a point due east of the centre of the magnet, having moved round a quadrant of a circle of radius $\frac{l}{2}$, where *l* is the length of the magnet. As a result the pole has been moved a distance $\frac{l}{2}$ to the east, and a distance $\frac{l}{2}$ to the south. The component motion in an easterly direction is accomplished without the performance of any work, since the force on the N pole acts from south to north. Hence the work performed on the N pole is the same as if it had been merely moved a distance $\frac{l}{2}$ from north to south.

Let *m* = the pole strength of the magnet, while H is the horizontal component of the earth's field. Then the earth's horizontal component exerts a force of *m*H dynes on the N pole, and this force is overcome through a distance $\frac{l}{2}$ cms. Hence $H \cdot \frac{ml}{2}$ ergs of work are performed. An equal amount of work is performed on the S pole, so that the total work $= 2H \frac{ml}{2} = H \cdot ml = HM$, where M is the magnetic moment of the magnet, equal to *ml*.

In the case cited, work = 0·16 × 1000 = 160 ergs.

*Inter. B.Sc.*—A pile is driven *a* feet vertically into the ground by *n* blows of a steam-hammer fastened to the head of the pile. Prove that if *p* is the mean pressure of the steam in lbs. per square inch, *d* the diameter of the piston in inches, *e* the length of the stroke in feet, *w* the weight in lbs. of the moving parts of the hammer, and W the weight of the pile and the fixed parts of the hammer attached to it, then the mean resistance of the ground in lbs. weight is—

$$W + w + \frac{nw}{W + w}\left(w + \frac{\pi d^2 p}{4}\right)\frac{e}{a}.$$

(Hicks's *Dynamics*, p. 60, No. 27.)

In this problem it is assumed that during the impact of the hammer-head with the pile, the latter is set in motion according to the ordinary laws of impact. Subsequently, the energy possessed by the pile at the instant when the hammer-head leaves it is used up in overcoming the resistance of the ground.

According to the laws of impact, if a body of mass *w*, moving with a velocity *v*, strikes a stationary body of mass W, then an amount of energy equal to—

$$(1 - \epsilon^2)\frac{wW}{W + w}v^2$$

is wasted, being transformed into heat, where $\epsilon$ is Newton's coefficient of restitution. In the present problem assume that $\epsilon = 0$. Then if the hammer-head were moving with a velocity *v* just before it struck the pile, its energy would then be equal to $\frac{1}{2}wv^2$. After impact, the energy usefully employed in driving the pile and its attachments would be equal to—

$$v^2 - \frac{wW}{W + w}v^2 = \frac{w^2}{W + w}v^2.$$

Thus only a fraction, equal to—

$$\frac{w}{W + w}$$

of the energy possessed by the hammer-head just before impact is usefully employed.

Now, while the hammer-head is being raised through a distance *e*, an amount of potential energy equal to *we* ft.-lbs. is stored in it. During the return stroke this energy is converted into the kinetic form, and is also increased by the work done by the steam in driving the piston—that is, by $\left(\frac{\pi d^2}{4}pe\right)$ ft.-lbs. Hence the energy possessed by the hammer-head the instant before it strikes the pile is equal to $\left(w + \frac{\pi d^2 p}{4}\right)e$, and a fraction, equal to $\frac{w}{W + w}$ of this, is utilised in driving the pile.

Further, after *n* strokes the pile and the steam-hammer attached to it have sunk through a distance of *a* ft.; therefore after each stroke the pile and its attachments sink through $\frac{a}{n}$ ft., thus liberating an amount of energy equal to $\frac{(W + w)a}{n}$ ft.-lbs.

Let F be the mean resistance in lbs. weight of the ground. Then the work done in overcoming this resistance through a distance of $\frac{a}{n}$ ft. must be equal to the energy liberated per stroke of the hammer.

$$\therefore \frac{Fa}{n} = \frac{(W + w)a}{n} + \frac{w}{W + w}\left(w + \frac{\pi d^2 p}{4}\right)e.$$
$$\therefore F = W + w + \frac{nw}{W + w}\left(w + \frac{\pi d^2 p}{4}\right)\frac{e}{a}.$$

*Amman.*—A convex lens of two inches focal length is held one inch from the eye by a person with distance of distinct vision of nine inches, so as to look at a small object. Where must the small object be placed? Illustrate your answer with a figure.

(Inter. Science, London, 1902.)

In order that the small object shall be seen with distinctness, the virtual image formed by the lens must be at nine inches from the eye, or eight inches from the lens. To find the distance *u* from the lens to the object, when the distance *v* from the lens to the image is equal to + 8 inches, the focal length *f* of the lens being equal to − 2 inches, we must substitute in the formula

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}.$$
$$\frac{1}{u} = \frac{1}{v} - \frac{1}{f} = \frac{f - v}{vf}.$$
$$\therefore u = \frac{vf}{f - v}$$
$$= \frac{8 \times (-2)}{-2 - 8} = +1{\cdot}6 \text{ inches.}$$

Thus the object must be placed 1·6 inches beyond the lens. The figure required presents no difficulty.

The following solutions can be had on application:—*Bat* (2), *Scientia*, *Garth*, *S.R.S.*, *Esk*, *P.E.D.M.* (2), *Shu*, *St. Xavier*, *Girt*, *Ethelbert*, *Arum* (2), *Redder*, *Nan*, *Bryn*.

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# THE EDITOR'S TABLE

## SOME RECENT TEXT-BOOKS AND MANUALS OF ENGLISH LITERATURE.

**A Sketch of English Literature.** By S. M. Du Pré. (Allman and Son.) One cannot turn the pages of this engaging little volume without feeling that the authoress has performed the difficult task she has set herself with a really eminent degree of success. The preface states that the aim of the work is to encourage pupils to read for themselves the works of the great English authors, and that the arousing of interest in the personality of the central figures of our literature is a great step in this direction. The book contains a vast store of matter; but the easy, pleasant style in which the facts are linked together, the tact and skill with which the many telling extracts are brought to bear, and the chatty way in which the life-stories of our greatest writers are narrated, make it easy to believe that in the hands of a judicious teacher the "Sketch" might serve a useful purpose as a reading-book.

It would scarcely be fair to speak critically of the shortness of the extracts used. They are cleverly connected with the descriptions, and the Introduction strongly recommends the employment of the text-book in conjunction with some suitable volume of specimen extracts. It speaks much for the writer's sense of proportion—and this is everywhere seen in the work—that of two hundred and forty odd pages of text, twelve have been devoted to Milton, eight to Shakespeare, and nine to Tennyson. The specialist will, of course, not be without cause for complaint. Thus the genius of Chatterton is disposed of when he is described as "a clever, thoughtful boy, with a passionate attachment to antiquities, and some gift for rhyming." But this does not detract from the general merit of the book.

There is no distinct treatment of the technicalities of poetry, but most of the points required by the average student are incidentally introduced, and the clearness with which this part of the work is done is not the least meritorious feature of the book. Thus the reference to the Earl of Surrey is accompanied by a simple treatment of blank verse, while the mention of Sir Thomas Wyatt affords occasion for a particularly lucid paragraph on the construction of the sonnet. The analysis of a regular Italian sonnet is, however, followed by the quotation of Drummond's "In Praise of a Solitary Life," which concludes with the rhymed couplet. This, surely, is a somewhat unfortunate choice.

A carefully classified list of books of reference forms a useful feature of the book.

As an illustration of the directness and simplicity with which really difficult points are treated, we quote the following:—"Shelley believed as firmly as Wordsworth that Nature is alive, and that the poet is brought into specially close communion with her."

Apart from the broader aims of the writer, the book will be found of real value as an examination handbook pure and simple.

**The Tragedy of Macbeth.** Edited for the Use of Students by A. W. Verity, M.A. (Cambridge University Press.) It was with a feeling approaching eagerness that we applied the paper-knife to this volume, so many good things had we read and heard respecting it. We gleaned from the preface that it forms the first number of a projected series—*The Student's Shakespeare*. A careful examination left us with the conviction that Shakespearian literature would be substantially enriched by the completion of such a series.

Mr. Verity's *Macbeth* has been described as "possibly the best" (school edition) "that has been produced of any play of Shakespeare," and we should not care to gainsay even so superlative an encomium.

In his scholarly introduction, Mr. Verity deals in a forcible and conclusive manner with such debatable topics as the dates of composition and publication, the relationship between the play and Middleton's *The Witch*, and the precise nature of the dramatist's adaptation of Holinshed's subject-matter. Originality is a decided characteristic of this introductory section, but the editor quotes, with fine effect, the opinions of such established critics as Gervinus and Campbell.

The text occupies 88 of the 336 pages of the book. The notes, which run to 115 pages, supply in masterly style the explanations, criticisms, and illustrations required, and the compiler has avoided the fashionable objection to philological complications by making his glossary a separate feature. Under this heading twenty-one pages are devoted to word-treatment, and the etymology has been made to bear upon the peculiarities of the text in a telling manner.

The glossary is followed by a series of twenty-eight extracts from Holinshed's *Chronicle*, the archaisms of which are interpreted by abundant footnotes.

An appendix takes under consideration such matters as the mysticism of the drama, the contemporary account of its production at The Globe, by Dr. Simon Forman, and the dramatic devices of the play. There is also a useful if somewhat lengthy chapter of "Hints on Metre," and Shakespeare's use of rhyme and of prose receives brief treatment.

**Macbeth.** Edited by A. W. Verity, M.A. Pitt Press Edition. (Cambridge University Press.) Many of the best features of the Student's Edition just referred to are to be found in the less voluminous but highly meritorious Pitt Press *Macbeth*. For younger readers who require a less exhaustive treatment the book may be highly recommended.

**Helps to the Study of Shakespeare's Henry the Fifth.** By C. W. Crook, B.A., B.Sc. (Ralph, Holland, and Co.) Of the many editions we have seen of the 1904 Certificate play, we know of none which is stamped more plainly and more frequently with the sign-manual of the practical teacher than Mr. Crook's volume. The editor, in his modest preface, disclaims any credit beyond that due to careful compilation. The book, however, displays an originality of treatment which will be all the more appreciable from the fact that Mr. Crook has kept studiously in mind the special requirements of those for whom the book is prepared. The volume is interleaved with ruled paper for use in note-making. The notes, which are copious almost to the point of extravagance, are printed in bold, readable type, below the text, on the pages to which they belong. Mr. Crook's method will scarcely escape criticism here, and we must confess to some sympathy with the objection that too little has been left for the student to do for himself. Even the matter of the fair princess's school-girl French has received complete treatment. In the fifty pages of introductory matter such essential subjects as the sources, date, history, inaccuracies, characters, language, and metre of the play are clearly and sufficiently dealt with. The concise hints as to methods of studying the play are thoroughly practical, and the two pages which discuss the Chorus are clear and to the point. The selections from Holinshed, which appear as an appendix, are given in modernised form, and the famous Allegory of the Bees (I. ii. 187–204) provides occasion for a second appendix, the lengthy extract from Lyly's *Euphues*, with which it is so curiously related. An intimate knowledge of the special needs of Certificate candidates warrants us in strongly recommending this book to them.

**Thackeray's Esmond.** With Introduction and Notes. (Macmillan and Co.) It is not an easy matter to estimate the nature and the extent of the assistance required by the average Scholarship student, who has to prepare Thackeray's great historical novel as a reading book. The anonymous editor of this volume has, however, performed the task in a really practical manner. A digest of the story, which runs to the length of seven or eight pages, is put together in such a way as to suggest the engrossing interest of the book. There is a useful biography of the novelist, while brief sketches of the plots of his greatest works of fiction, together with descriptive references to the sets of papers and miscellaneous productions, serve to show the relative place occupied by *Esmond* among the writer's works. One chapter deals in the orthodox manner with the chief characters who appear in the novel. The reader who negotiates the novel with a view of supplying a strong background to the great period in history covered by the plot should find the list of dates—comprising both historical events and the details of the story—a useful feature. Textual difficulties, allusions, etc., receive attention in the forty pages of notes printed at the end. A conspicuous amount of care has been taken to make the explanations really telling, and an intelligent

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**The Golden Treasury of Songs and Lyrics: Book Third.** Edited, with Notes, by J. H. Fowler, M.A. (Macmillan and Co.) Mr. F. T. Palgrave's exquisite anthology is refined gold which it seems well-nigh wasteful to attempt to gild. The four books (First Series) are set as a part of the general reading prescribed for acting teachers taking the Certificate Examinations of 1903 and 1904. There can be little doubt as to the wisdom of the choice so far as the formative influence of such a course of reading is concerned. To the timid student, and to the conscientious teacher too, the treatment of the 132 poems, for examination purposes, must certainly appear no slight task. Mr. Fowler, in dealing with the Third Book, has undertaken the work of annotation with great thoroughness. The Certificate student who has due regard for the economy of his time will need much discretion in his use of the hundred pages of notes which accompany the sixty pages of text. As a book of reference, the edition will be found of such substantial assistance that it should be in the hands of every private student who aims at seriously negotiating this part of the year's work. An intimate acquaintance with the needs of Certificate candidates suggests the opinion that a careful classification of the poems according to their subjects, and an indication of the specially characteristic pieces, would be a very valuable feature in such a handbook. A useful glossary of Scottish words is given.

**Blackie's English Classics:** Cowper's *Task*, Book V.; Milton's *English Sonnets*; Scott's *Lord of the Isles*, Canto II. and Canto VI. Edited by E. H. Blakeney, M.A. These inexpensive little handbooks are to be commended for the clearness with which the texts are arranged and printed, as well as for the practical value of their annotation. Scholarship candidates should note Book V. of Cowper's *Task*. The excerpt from Milton contains a useful treatment of the technicalities of the sonnet.

**Evangeline; The Song of Hiawatha.** Edited by F. Gorse, M.A. (A. M. Holden.) The ponderous lines of Longfellow's Tale of Acadie appear more than usually massive on the severely arranged pages before us; while the two-and-twenty sections of *Hiawatha* are economically packed into sixty pages of double columns. The second book contains a good vocabulary of the native words used in the poem, and the careful annotation of both works will be found sufficient for ordinary purposes.

**The Picture Shakespeare: King John.** (Blackie and Son.) An introductory note informs us that this book has been prepared for the special use of pupils reading for the College of Preceptors and Junior Local Examinations. The lengthy list of well-known teachers who have shared the work of revision guarantees the merit of the work. The text has been judiciously pruned; there are several good pictures, including a pretty frontispiece in colours; and altogether the edition seems calculated to meet the needs of those for whom it is intended.

**Macbeth.** With Introduction, etc., by F. Johnson. "School Shakespeare." (Blackwood and Sons.) A good feature of this inexpensive but practical treatment of *Macbeth* is the plan by which appropriate selections from Holinshed's *Chronicle* are placed in the notes, at the head of the acts upon which they respectively bear. The notes themselves are decidedly elementary. An exhaustive glossary is appended. The story of the play is told in a particularly interesting way, and altogether the work of editing a play for schoolroom use has been performed with great success.

**Macbeth.** Edited by M. J. C. Meiklejohn, B.A. **Henry the Fifth.** Edited by R. F. Cholmeley, M.A. "The Blackfriars Shakespeare." (A. M. Holden.) In these new numbers the high reputation of the Meiklejohn Series appears to be fully maintained. Carefully compiled sets of examination papers are included in each book. There are good introductory chapters on the plot, characters, etc., and the *Macbeth* volume has a capital collection of "Notes on Old or Unusual Grammar." The books are excellently printed, and the binding and general get-up are remarkable, considering the low price at which the volumes are issued.

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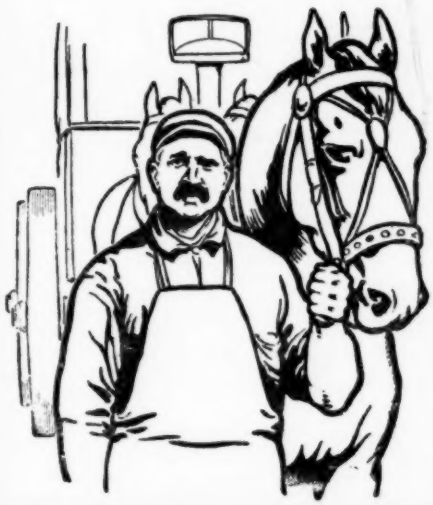

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**The Protestant School System in the Province of Quebec.** By John Adams, M.A., B.Sc., etc., Professor of Education in the University of London, formerly Principal of the United Free Training College, Glasgow. This publication—it is too big to call a pamphlet, and is yet more akin to the pamphlet than the book in its paper cover and otherwise—is a pleasant thing to handle, from its beautiful typography and its soothing feel in the hand. From internal evidence we conclude that it is a formal report on the subject announced in the title, based on a very thorough study of that subject; but there is no hint given by way of preface or otherwise to indicate the circumstances under which the study was undertaken, or the authorities to whom the report was first presented. And these are things the reader would like to know, for the report is a document which should command attention and excite interest even on this side the Atlantic.

During the earlier half of this year, Professor Adams spent a little over two months in visiting Protestant schools in the Province of Quebec. The number visited was one hundred and eighty—a formidable task for so short a time, when the thoroughness of his inquiry is taken into account. In his report we are enabled to see clearly the strong points and the weak points of the Quebec school system. The weaknesses are chiefly in the district schools—the elementary school of the "rural" type—and they are weaknesses which no scheme of management has ever been able wholly to eliminate from small country schools. How to provide an adequate salary for a properly-trained teacher, and necessary apparatus and buildings for a school of ten pupils—that is the crux of the rural question there as well as here.

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The suggestions for improvement made by Professor Adams are such as amply justify his selection for this investigation, and their adoption would give an immense impetus to the cause of education. Their success, moreover, might lead to their wider adoption. The only one which we need mention here is the *endowment of the teacher*, which has been the real cause of the high level of education in the Scottish counties under the operation of the Bick and Milne Bequests. But the whole report is so condensed that to condense it further by way of summary is impossible. It is an admirable piece of educational work, and forms an additional proof, if such were needed, that the new professor of education in London University is a master of his subject from the administrative and practical as well as from the philosophical and theoretical side.

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There are many inexcusable typographical errors. On page 65 Paul Bert appears as "Paul Best;" our old friends Messrs. Dexter and Garlick would hardly recognise themselves as "Denten and Gorleib." Landon appears as "Lander," Professor Zehden as "Zebden," while the publisher of one book is given as "Boston, U.S.A.," and of another as "U.S.A."

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A map of Africa and another of Southern Africa, both coloured, make a distinct improvement on the former edition. It would greatly enhance the value of this first-rate geography if half a dozen maps of other parts of Africa were inserted. The Nile basin, the Congo basin, N.W. Africa, among others, might well be represented. The book is a student's book, and a student likes his maps handy, as it saves time. The geography deserves a good reception.

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